SONY®

DIGITAL TIMEBASE CORRECTOR

BKH-2150

AD20
MY21
SG10
PR64

INSTALLATION AND MAINTENANCE MANUAL
1st Edition (Revised 3)
Serial No. 10001 and Higher

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第1章
取り扱い操作

1-1. 概要

BKH-2150は、ソニー1インチ・ビデオテープレコーダーBVH-2000／2180用のプラグインタイムベースコレクターで、4枚基板で構成されています。広範囲のタイムベースエラー補正が可能で、ノーマル再生および−1～＋3倍速のダイナミックトラッキング再生で、良好な画像を得ることができます。

1-2. 特長

● VELOCITY ERRORには高次近似曲線を用いて最適補正を行っているため、良好な画質を得ることができます。

● デジタルのドロップアウトコンペンセーターを装備しており、Y／Cとも1H前部分置換です。

● SG-10基板上のS3、S4スイッチにより、10H～21Hラインまでの任意のラインのブランキングをON／OFFすることができます。

● SHUTTLEモードでは、±7倍速まではカラー画像で、±50倍速までは白黒画像で、画像を探すことができます。

● 外部よりリモートコントロールできます。

● 9 bit×4 fscのサンプリングです。

● MY-21基板上のS1スイッチにより、ビデオ信号のクロミナンス成分をOFFすることができます。

ご注意

● BVH-2000は、シリアルNo.33301以降のものをお使いください。それ以前のものは使用できません。

● BVH-2180はすべて使用できます。

1-3. 仕様

消費電力	37W
基板寸法（幅／高さ／奥行き）	23×155×325mm
重量	2.5 kg（基板4枚）
動作温度	5℃～40℃

ビデオ系

帯域幅	フラット～4.2 MHz ±0.3 dB
S／N	58 dB
DG	2%以下
DP	2° 以下
Kファクター	1%以下
ウィンドウ	15 Hp-p
残留エラー　カラー	±2.5 ns以内
残留エラー　白黒	±15 ns以内
Y／Cディレイ	20 ns以内

プロセッサー調整範囲

OUTPUT VIDEO LEVEL	±3 dB
CHROMA LEVEL	±3 dB
SET UP LEVEL	±15 IRE
HUE	±15°
SYSTEM SC PHASE	360° 以上
SYSTEM SYNC PHASE	−1～＋3 μs

仕様および外観は、改良のため予告なく変更することがありますが、ご了承ください。

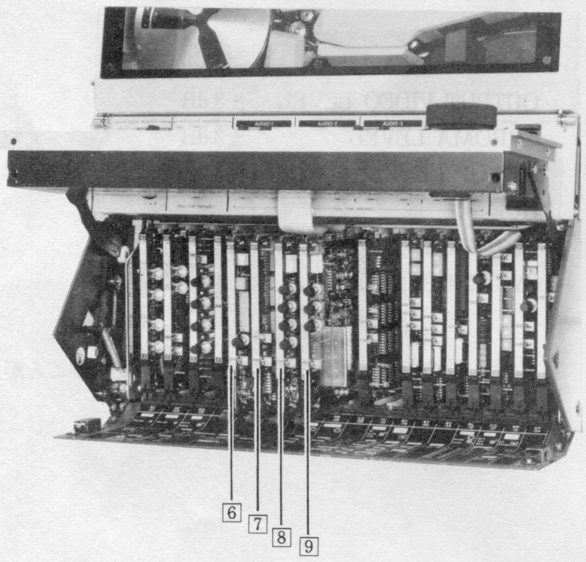
1-4. 取り付け

1-4-1. 基板の挿入

必ず次の事項を厳守してください。

- ●プリント基板を挿入するときは、必ず電源をOFFにしてください。
- ●プリント基板を挿入するときは、プリント基板挿入指定番号（本体下部）とプリント基板番号（基板上部）を確認し、必ず下図の所定の位置に入れてください。
- ●通電するときは、再度プリント基板の位置を確認します。挿入位置を誤ったまま通電すると、回路を破損することがあります。

原則としてプリント基板を抜き差しすることは避けてください。



	基板番号	基板名
BKH-2150	6	AD-20 A／D CONVERTER
	7	MY-21 MEMORY
	8	SG-10 SYNC GENERATOR
	9	PR-64 PROCESSOR

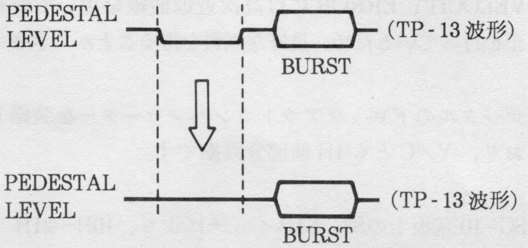
1-4-2. 初期設定

必ず次の初期設定をしてください。

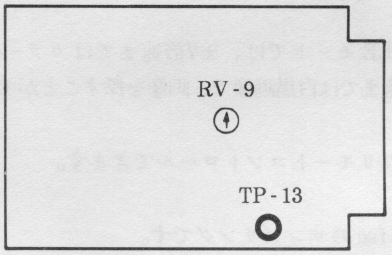
●ペデスタルレベルオフセットの調整

調整方法1

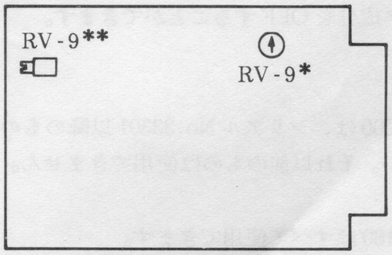
PR-64基板のTP-13端子の出力波形が、下図となるように、AD-20基板のRV-9を前面から調整します。
（シリアルNo. 10001～10420の基板ではRV-9の位置が異なりますので、延長基板を使用してください）



PR-64基板



AD-20基板



* シリアルNo. 10001～10420の基板に適用
** シリアルNo. 10501以降の基板に適用

調整方法2

TBCリモートコントロールユニットのSET-UP PRESETスイッチをPRESETにします。

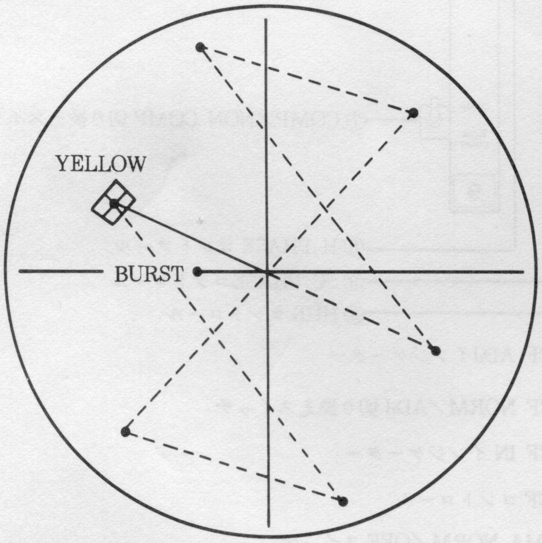
BVH-2000／2180の映像出力信号を波形モニターで見ながら、SET-UPが0 IREになるように、PR-64基板上のRV-9を調整します。

●HUEのPRESET

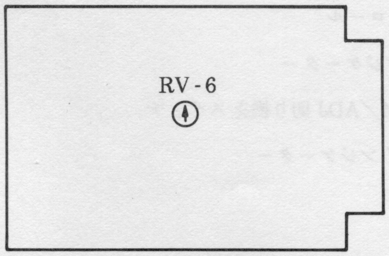
リモートコントロールユニットBK-2006（別売り）使用時は、SG-10基板のREMOTE／LOCAL切り換えスイッチ（S1）をREMOTE側にします。さらにBK-2006のHUE RESETスイッチをPRESET側にします。

BK-2006を使用していないときは、SG-10基板のREMOTE／LOCAL切り換えスイッチ（S2）をLOCAL側にします。さらに、SG-10基板のHUEコントロールつまみを回して、IC9の1ピンが0Vとなるように調整します。

以上の操作が終ったら、ベクタースコープで下図のようにBURSTとYELLOWの相対位置を、SG-10基板のRV-6で調整します。

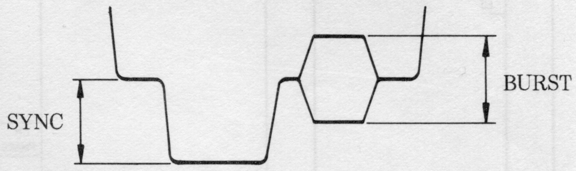


SG-10基板



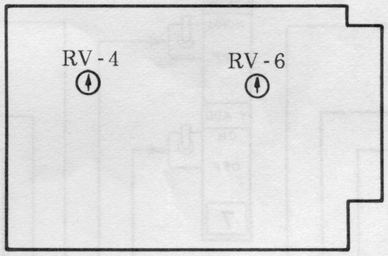
●SYNCおよびBURSTレベルの調整

延長基板でPR-64基板を引き出し、BVH-2000／2180のVIDEO-1 OUTPUT端子からの映像出力信号を波形モニターで見ながら、SYNCおよびBURSTのレベルを調整します。SYNCのレベル調整にはPR-64基板のRV-6を、BURSTのレベル調整にはRV-4を使用します。



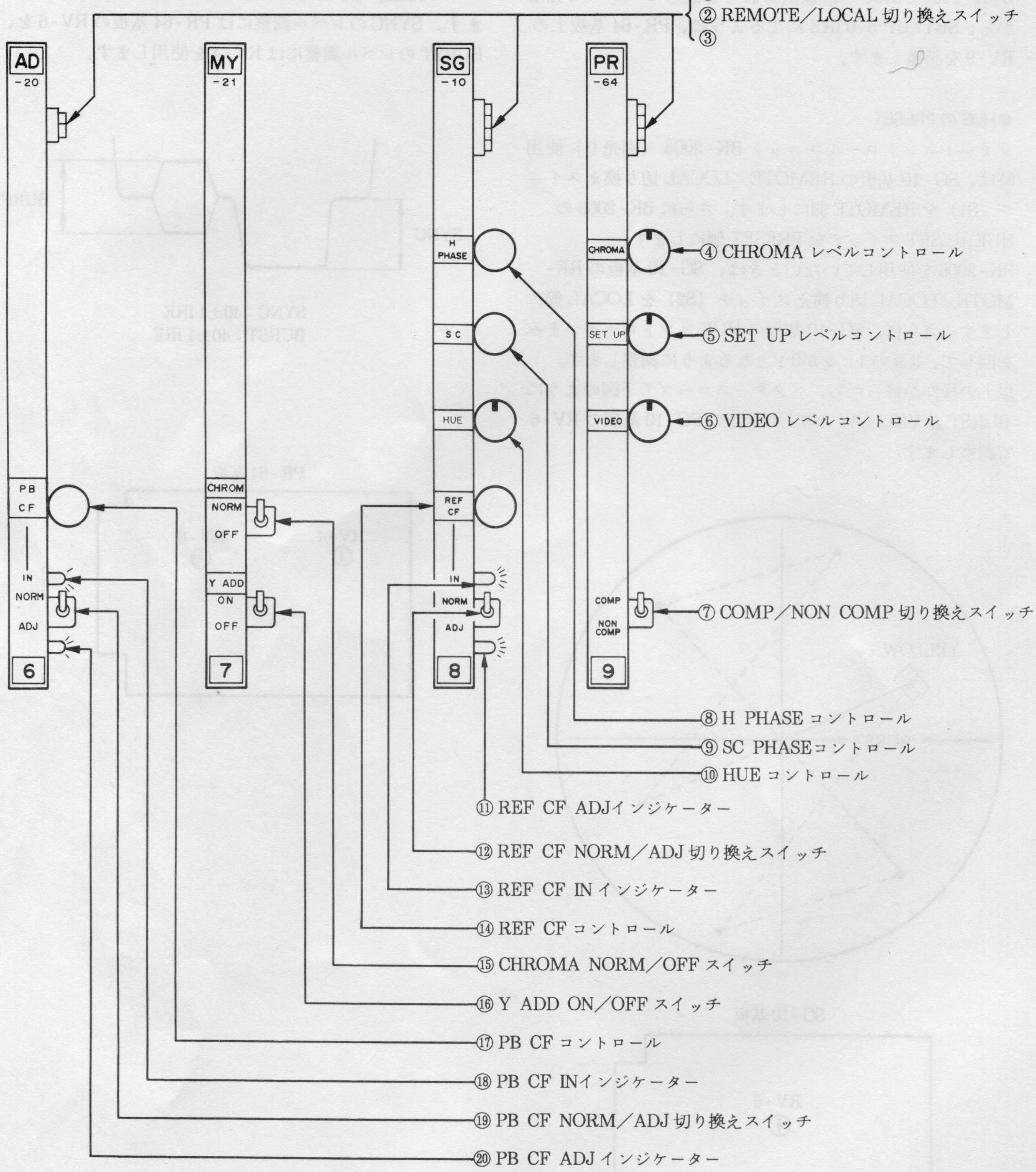
SYNC : 40±1 IRE
BURST : 40±1 IRE

PR-64基板



1-5. 各部の名称と働き

1-5-1. 前面操作部



①REMOTE／LOCAL切り換えスイッチ (SYSTEM SYNC, SC PHASE, HUE)

②REMOTE／LOCAL切り換えスイッチ (CHROMA, SET UP, VIDEO)

TBCリモコンユニットBK-2006(別売り)を使用の場合はREMOTE側にします。

③REMOTE／LOCAL切り換えスイッチ (PB CF、PB CF ADJ)

● この2つのスイッチは、必ず連動して同じ方向へ倒してください。

④CHROMAレベルコントロール

CHROMAレベル調整ボリュームで、±3dBの可変範囲を有します。

⑤SET UPレベルコントロール

SET UPレベル調整ボリュームで、±15 IREの範囲でSET UPを可変できます。

⑥VIDEOレベルコントロール

VIDEOレベル調整ボリュームで、±3dBの可変範囲を有します。

⑦COMP／NON COMP切り換えスイッチ

BVH-2000／2180のVIDEO OUT端子の出力をCOMPかNON COMPに切り換えられます。

OUTPUTの切り換えモードは、1-10(J)ページ「TBC OUT選択」の項を参照。

⑧H PHASEコントロール

SYSTEM SYNC PHASE調整ボリュームで、$-1\sim+3\mu s$の範囲で基準ビデオ信号に対して可変できます。

⑨SC PHASEコントロール

SYSTEM SC PHASE調整ボリュームで、360°以上基準ビデオ信号に対して可変できます。

⑩HUEコントロール

HUE調整ボリュームでHUEを±15°変えることができます。

⑪REF CF ADJインジケーター

リファレンス側のカラーフレーミング調整中を表示するインジケーターで、調整中は赤に点灯します。

⑫REF CF NORM／ADJ切り換えスイッチ

リファレンス側のNORM：通常はこの位置にします。

ADJ：カラーフレミングの調整をするとき、この位置にします。調整が終わったらNORMの位置に戻します。

⑬REF CF INインジケーター

リファレンス側のSC-Hの最適位相を表示します。グリーンに点灯すれば調整完了です。

⑭REF CFコントロール

リファレンス側のSC-H位相が最適になるように調整します。（詳しい調整方法は1-6.を参照）

⑮CHROMA NORM／OFFスイッチ

NORM：通常はこの位置にします。

OFF：ビデオ信号中のクロマ成分をOFFにします。ただしバースト信号はOFFされません。

⑯Y ADD ON／OFFスイッチ

ON：ダイナミックトラッキング再生時に、フィールドが反転した場合、ルミナンス信号をライン加算して、インターリーブ関係を保った信号を出力します。

OFF：ライン加算を行いません。

⑰PB CFコントロール

オフテープ側のSC-H位相が最適になるように調整します。（詳しい調整方法は1-6.を参照）

⑱PB CF INインジケーター

オフテープ側のSC-Hの最適位相を表示します。グリーンに点灯すれば調整完了です。

⑲PB CF NORM／ADJ切り換えスイッチ

NORM：通常はこの位置にします。

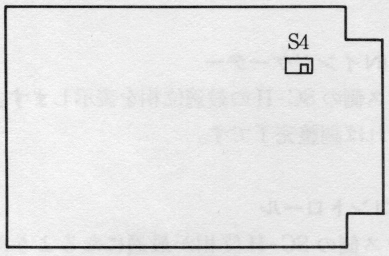
ADJ：オフテープ側のカラーフレーミングの調整をするとき、この位置にします。調整が終わったらNORMの位置に戻します。

⑳PB CF ADJインジケーター

オフテープ側のカラーフレーミング調整中を表示するインジケーターで、調整中は赤に点灯します。

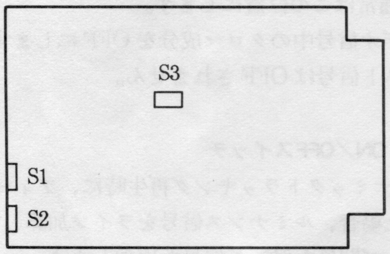
1-5-2. 基板内部

AD-20 基板



S4：ONにすると、VTRのTAPE／EE選択スイッチがTAPE側のときにSTANDBYランプが消えた場合、TBCからノイズが出力されるのを禁止します。OFFではノイズのままDEMOD OUT信号が出力されます。

MY-21 基板

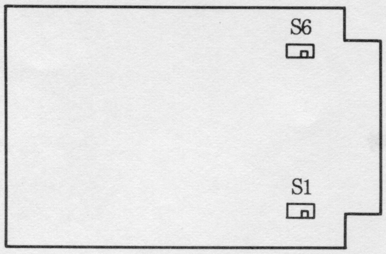


S1：OFFにすると出力信号のクロマ成分が0になります。（赤のLEDが点灯）

S2：ONにすると、VTRがDT動作時に再生信号のフィールドと基準信号のフィールドが一致しない場合、ライン加算を行います。OFFにすると、ライン加算を行いません。垂直ブランキング内の信号は、スイッチの位置に関係なくライン加算を行いません。

S3：ドロップアウト補正をON／OFFします。使用時は必ずON側に設定してください。

SG-10基板



S1：ONにすると、VTRがプレビューモードのときに、TBC出力信号の同期信号を基準信号に対して4H遅延させ、映像信号と同期信号の相対位相を一致させます。OFFにすると、TBC出力信号の同期信号は基準信号に一致し、映像信号は2〜6H垂直方向にシフトします。

S6：ONにすると、VTRがEEモードのときに、TBC出力信号の同期信号を基準信号に対して4H遅延させ、映像信号と同期信号の相対位相を一致させます。OFFにすると、TBC出力信号の同期信号は基準信号に一致し、映像信号は4H垂直方向にシフトします。

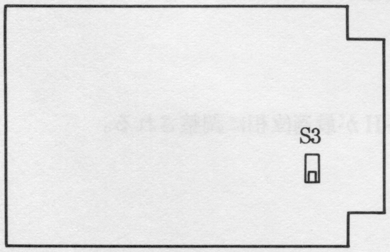
動作の一覧を下表に示します。
映像、同期信号共4H遅延している場合、その信号を内部同期モードのピクチャーモニターで見ると、プレビューモード時に縦シフトが起こらず、正しい状態でモニターができます。

VTRの各モードについては、VTRの取扱説明書の“編集時のモニター”の項を参照してください。

スイッチ / VTRのモード	S1		S6	
	ON	OFF	ON	OFF
PLAY (EDIT プリセット)	同期、映像信号とも、4H遅延	同期信号：0H 映像信号：2〜6H 遅延	動作に無関係	
EE	動作に無関係		同期、映像信号とも、4H遅延	同期信号：0H 映像信号：4H 遅延

●入力基準信号に対してTBC出力信号の遅れの状態を示します。

PR-64基板



S3：ONにすると、VTRのサーボ基準信号にカラーバースト信号がない場合を除き、TBC出力信号にカラーバースト信号を付加します。OFFにすると、カラーバースト信号を付加しません。

1-6. 調整

リファレンス側カラーフレーミングの調整
（リファレンス側SC-Hの最適位相調整）

操作	備考
正しいREF信号を入力する。	
↓ H PHASEコントロール、SC PHASEコントロールを調整する	
↓ REF CF NORM／ADJスイッチ⑫をADJ側にする。	調整状態に入る。 調整中は、REF CF ADJインジケーター⑪が赤に点灯する。
↓ REF CFコントロール⑭を回してREF CF INインジケーター⑬が緑に点灯するようにする。	リファレンス側のSC-Hが最適位相に調整される。
↓ REF CF NORM／ADJスイッチ⑫をNORM側にする。	調整完了。 REF CF ADJインジケーターが消灯。

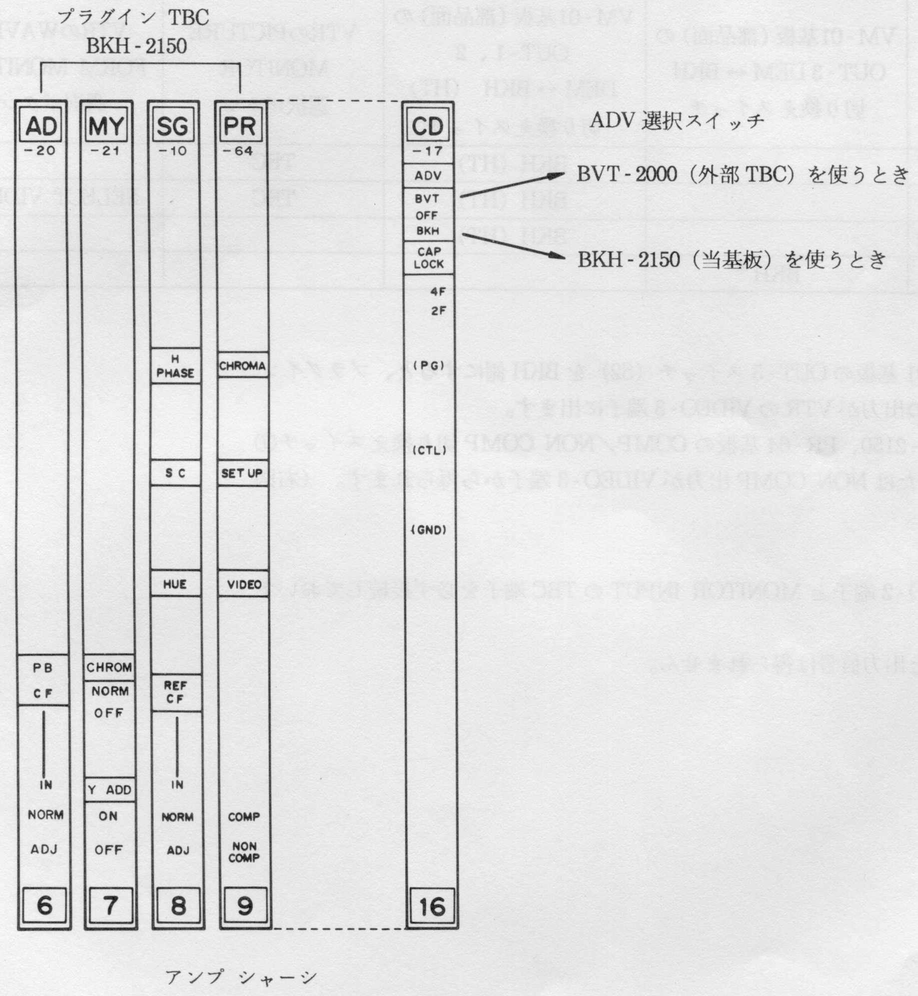
オフテープ側カラーフレーミングの調整
（オフテープ側SC-Hの最適位相調整）

操作	備考
VTRを順方向1倍速再生モードにする。	
↓ PB CF NORM／ADJスイッチ⑲をADJ側にする。	調整状態に入る。 調整中は、PB CF ADJインジケーター⑳が赤に点灯する。
↓ PB CFコントロール⑰を回してPB CF INインジケーター⑱が緑に点灯するようにする。	オフテープ側のSC-Hが最適位相に調整される。
↓ PB CF NORM／ADJスイッチ⑲をNORM側にする。	調整完了。 PB CF ADJインジケーター⑳が消灯。

1-7. 操作

アドバンスの選択

BVH-2000／2180本体のCD-17基板のADV選択スイッチをBKH側にします。スイッチを切り換えることにより、ドラム位相はREF SYNCに対し、8.5H進むようになります。



REMOTE／LOCAL 選択

BKH-2150の SG-10基板、PR-64基板、AD-20基板 REMOTE／LOCAL 切り換えスイッチ①、②、③を LOCAL にします。

ご注意

BK-2006（別売り）を使用する場合は、AD-20基板上の REMOTE／LOCAL 切り換えスイッチを LOCAL にします。

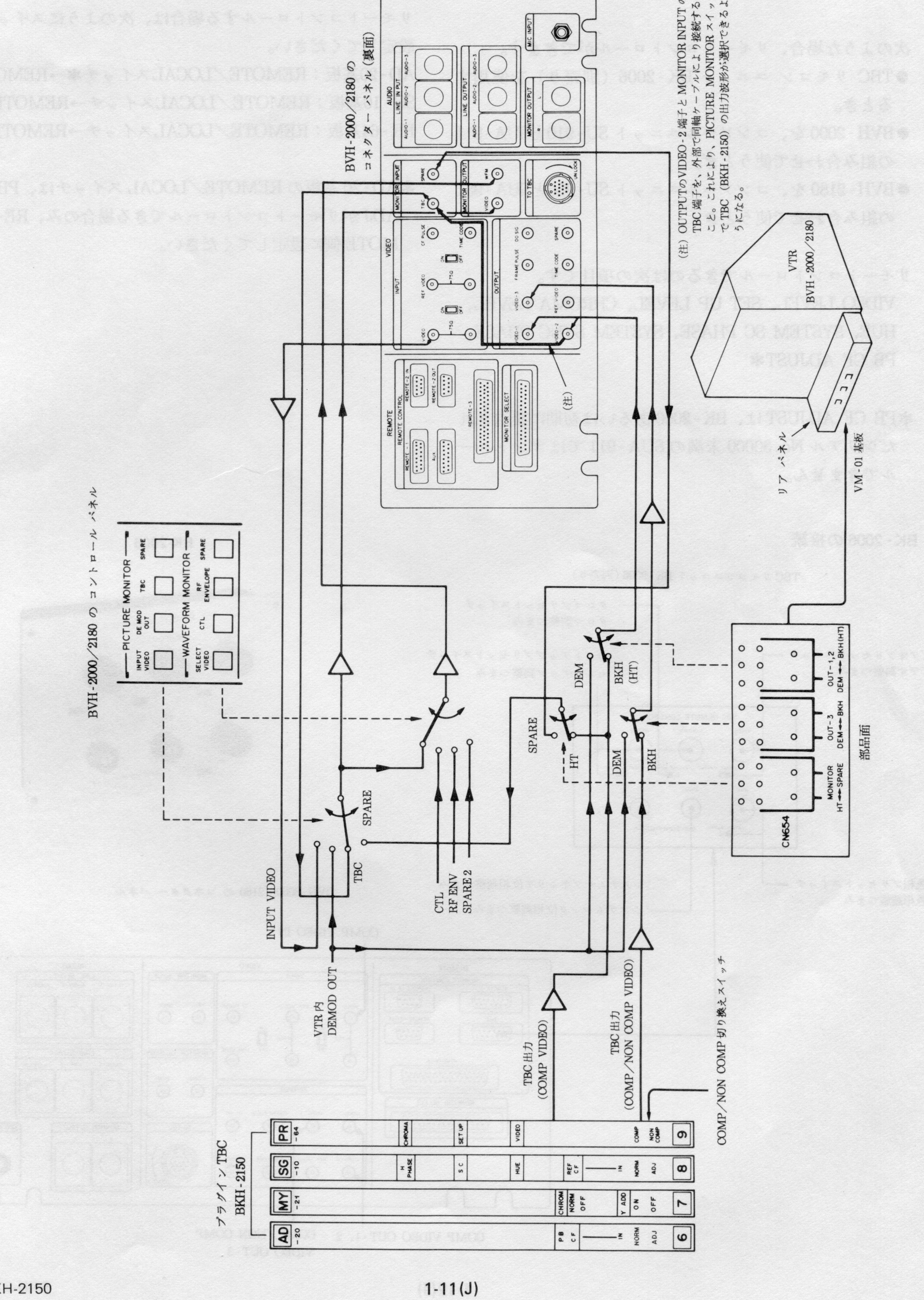
TBC OUT 選択

OUTPUT	VM-01基板（部品面）の OUT-3 DEM ↔ BKH 切り換えスイッチ	VM-01基板（部品面）の OUT-1、2 DEM ↔ BKH (HT) 切り換えスイッチ	VTRのPICTURE MONITOR 選択ボタン	VTRのWAVE-FORM MONITOR 選択ボタン
MONITOR VIDEO*2		BKH (HT)	TBC	
MONITOR WFM*2		BKH (HT)	TBC	SELECT VIDEO
VIDEO-1、VIDEO-2		BKH (HT)		
VIDEO-3	BKH*1			

*1 VTR本体の VM-01基板の OUT-3スイッチ（S2）を BKH 側にすると、プラグイン TBC、BKH-2150の出力が VTR の VIDEO-3端子に出ます。
この状態で、BKH-2150、PR-64基板の COMP／NON COMP 切り換えスイッチ⑦により、COMP または NON COMP 出力が VIDEO-3端子から得られます。（右図参照）

*2 OUTPUT の VIDEO-2端子と MONITOR INPUT の TBC 端子を必ず接続しておいてください。
接続されていないと出力信号は得られません。

1-8. シグナル フローチャート



1-9. リモートコントロール

次のような場合、リモートコントロールができます。

- ●TBC リモコン ユニット BK-2006（別売り）を使用するとき。
- ●BVH-2000を、コンソールユニット SU-910とSUA-911の組み合わせで使うとき。
- ●BVH-2180を、コンソールユニット SU-950とSUA-951の組み合わせで使うとき。

リモートコントロールできるのは次の項目です。

VIDEO LEVEL、SET UP LEVEL、CHROMA LEVEL、HUE、SYSTEM SC PHASE、SYSTEM SYNC PHASE、PB CF ADJUST*

*PB CF ADJUSTは、BK-2006あるいは初期に製造されたシリアルNo.30000未満のSUA-911ではコントロールできません。

スイッチの設定

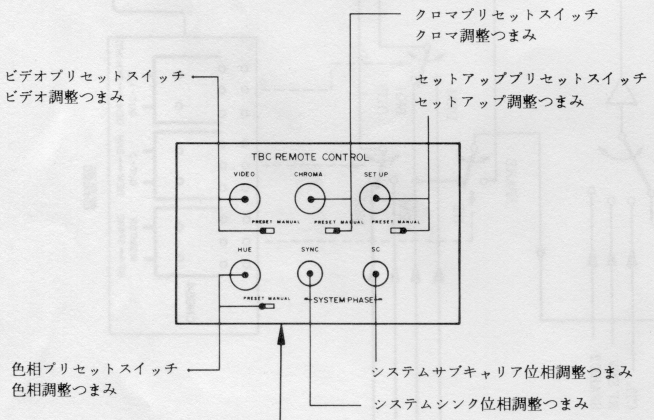
リモートコントロールする場合は、次のようにスイッチを設定してください。

AD-20基板：REMOTE／LOCALスイッチ*→REMOTE
SG-10基板：REMOTE／LOCALスイッチ→REMOTE
PR-64基板：REMOTE／LOCALスイッチ→REMOTE

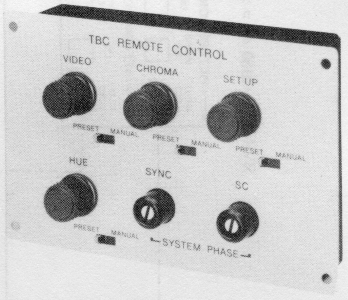
*AD-20基板のREMOTE／LOCALスイッチは、PB CF ADJがリモートコントロールできる場合のみ、REMOTE側に設定してください。

BK-2006の接続

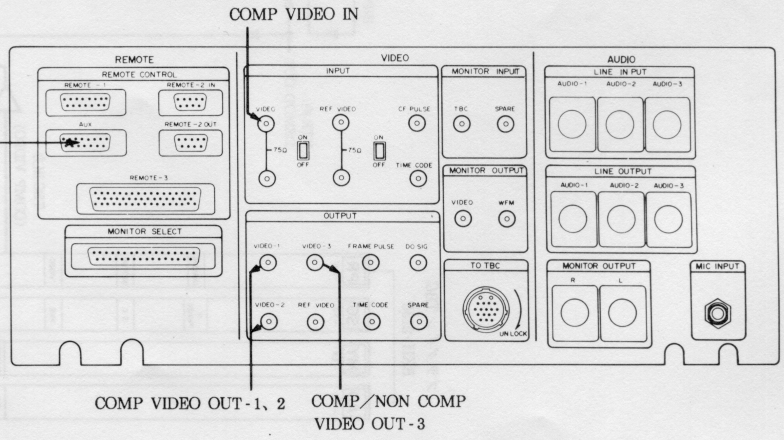
TBCリモコンユニット BK-2006（別売り）



BK-2006



BVH-2000／2180 の コネクター パネル



SECTION 1
OPERATION

1-1. OUTLINE

The BKH-2150 is a plug-in type time base corrector composed from four circuit boards for the Sony 1-inch video tape recorder BVH-2000/2180. This time base corrector has been designed to be used in the BVH-2000 electronic bay. A wide range of time base correction is possible. A high quality picture can be obtained in normal playback and in dynamic tracking playback of –1 to +3 times normal speed.

1-2. FEATURES

- Velocity error is compensated with the approximate curve to obtain a high quality picture.
- Built-in digital dropout compensator replaces the dropout section with the 1 H prior signal.
- Horizontal lines from the 10th to the 21st of the V-blanking can be set to on and off independently with the S3 and S4 switches on the SG-10 board.
- In shuttle mode, a picture can be searched in color up to ±7 times normal speed and in monochrome up to ±50 times normal speed.
- Remote-control is possible with the external equipment.
- Playback sampling is 9 bits x 4 fsc.
- The chrominance signal of the video signal can be cut off by the S1 switch on the MY-21 board.

Note
When the BKH-2150 is installed into the BVH-2000, make sure the BVH-2000 has the serial No. 33501 or higher. The BVH-2000 with a lower serial No. cannot be used.

1-3. SPECIFICATIONS

1-3-1. General

Power consumption	37 W
Dimensions	23 x 155 x 325 mm (w/h/d) (29/32 x 6 1/8 x 12 7/8 inches)
Weight	2.5 kg (including 4 boards) (5 lb 8 oz)
Operating temperature	5°C to 40°C (41°F to 104°F)

1-3-2. Video

Bandwidth	Flat to 4.2 MHz ±0.3 dB
Signal-to-noise ratio	58 dB
DG	Less than 2%
DP	Less than 2°
K-factor	Less than 1%
Window	15 H(p-p)
Residual error	Color: within ±2.5 ns Monochrome: within ±15 ns
Y/C delay	Within 20 ns

1-3-3. Processor Adjustment Range

OUTPUT VIDEO LEVEL	±3 dB
CHROMA LEVEL	±3 dB
SET UP LEVEL	±15 IRE
HUE	±15°
SYSTEM SC PHASE	More than 360°
SYSTEM SYNC PHASE	–1 to +3 μs

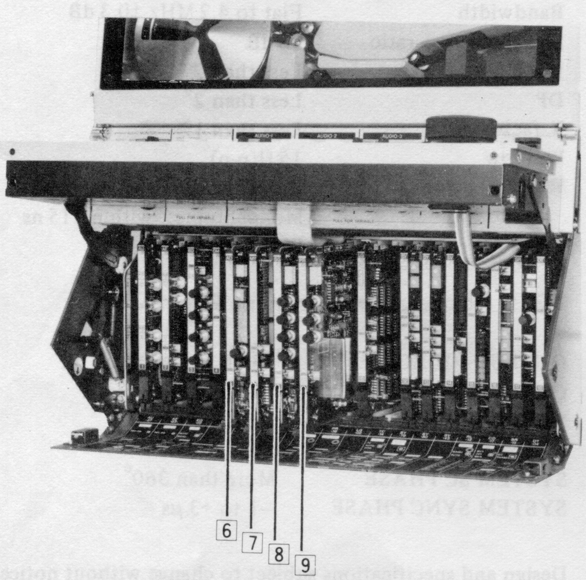
Design and specifications subject to change without notice.

1-4. INSTALLATION

1-4-1. Installation Notes

- Turn the power off to install boards.
- Correctly install the boards into the slots referring to the numbers on the boards and on the slots as illustrated below.
- Before turning the power on, check that the boards are installed into the correct slots. If they are installed into the wrong slots, the circuit may be broken.

Do not remove or reinsert the boards unless it is necessary.

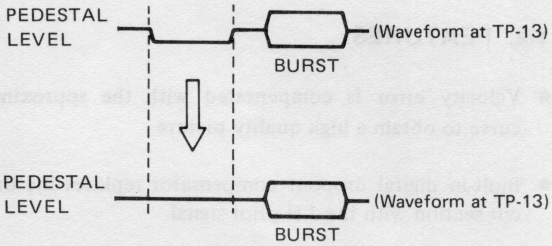


	Board No.	Board Name	
BKH-2150	6	AD-20	A/D CONVERTER
	7	MY-21	MEMORY
	8	SG-10	SYNC GENERATOR
	9	PR-64	PROCESSOR

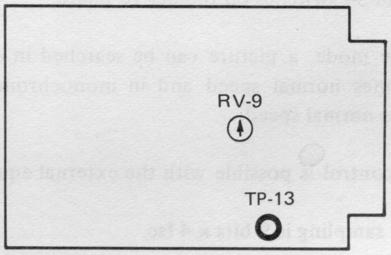
1-4-2. Initial Setting

Pedestal level offset adjustment

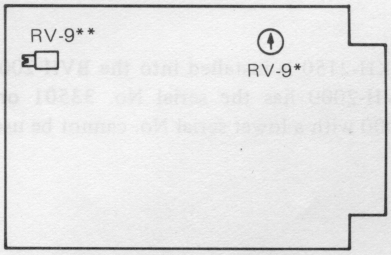
Method 1
Adjust the RV-9 on the AD-20 board so that the waveform at the TP-13 on the PR-64 board will be as shown below. (On a BKH-2150 with serial numbers 10001 to 10420, the RV-9 cannot be reached from the front of the AD-20 board. Therefore, pull out the AD-20 board using an extension board.)



PR-64 board



AD-20 board



* On a BKH-2150 with serial numbers 10001 to 10420, the RV-9 is located at the position marked with one asterisk.

**On a BKH-2150 with serial numbers 10501 and higher, the RV-9 is located at the position marked with two asterisks.

Method 2

Set the SET UP PRESET switch on the TBC remote control unit to PRESET.

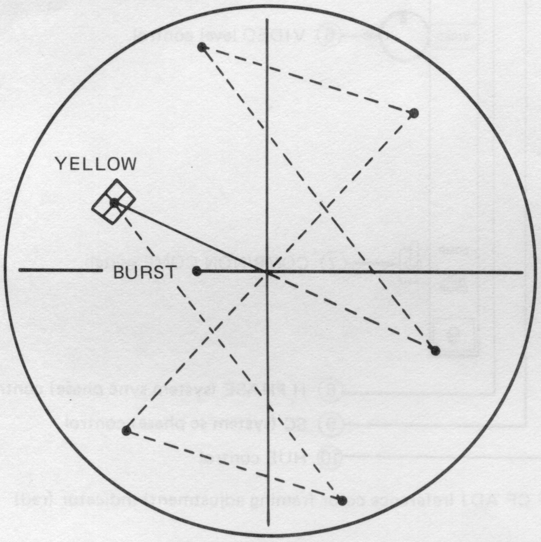
Observe the video output signal on the waveform monitor and adjust the RV-9 on the PR-64 board so that the set-up will be 0 IRE.

HUE preset

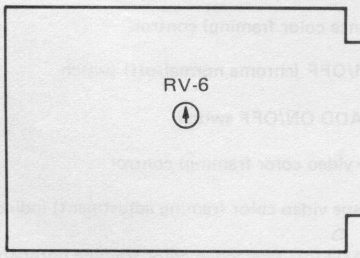
When the BK-2006 remote control unit (optional) is used, set the REMOTE/LOCAL switch (S1) on the SG-10 board, to REMOTE, and the HUE switch on the BK-2006 to preset.

When the BK-2006 is not used, set the REMOTE/LOCAL switch (S2) on the SG-10 board to LOCAL, and turn the HUE control so that the output at the first pin of the IC9 will be 0 V.

Then adjust the RV-6 on the SG-10 so that the relative phase of the BURST and YELLOW as illustrated below on the vectorscope.

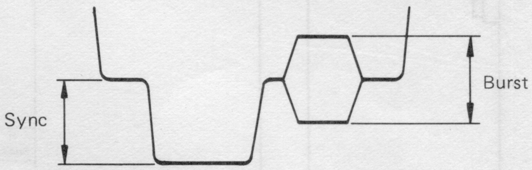


SG-10 board



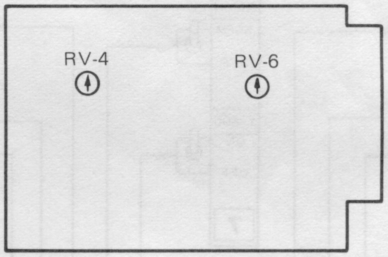
Sync and burst signal level adjustments

Pull out the PR-64 board using an extension board. While observing the video output signal from the VIDEO-1 OUTPUT connector of the BVH-2000/2180 on the waveform monitor, adjust the levels of the sync and burst signals. To change the sync signal level, adjust the RV-6 on the PR-64 board; to change the burst signal level, adjust the RV-4 on the PR-64 board.



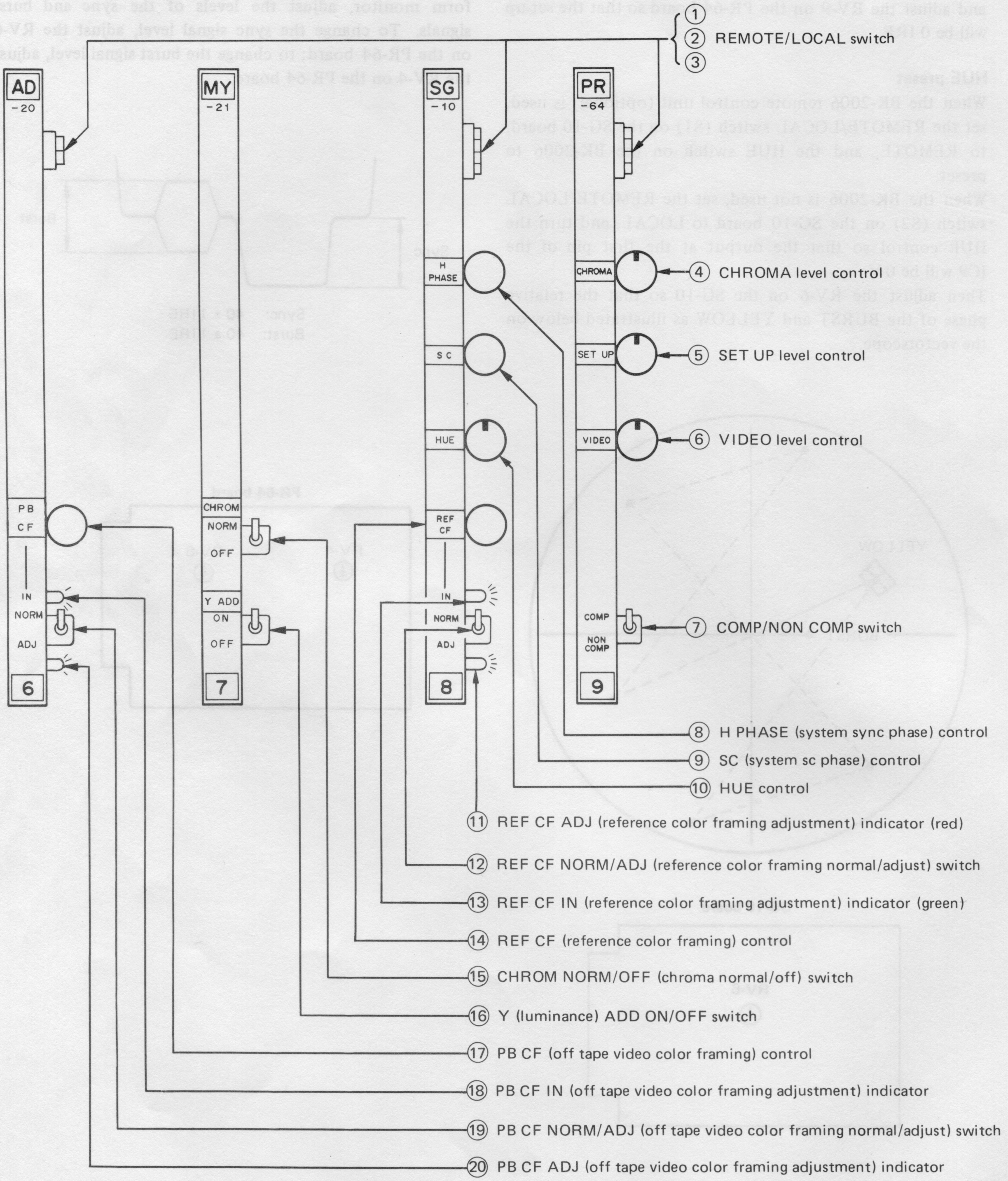
Sync: 40 ± 1 IRE
Burst: 40 ± 1 IRE

PR-64 board



1-5. LOCATION AND FUNCTION OF PARTS

1-5-1. Front Panel



① **REMOTE/LOCAL switch (for H PHASE, SC, HUE)**
Set to REMOTE when the BK-2006 remote control unit is used.

② **REMOTE/LOCAL switch (for CHROMA, SET UP, VIDEO)**
Set to REMOTE when the BK-2006 remote control unit is used.

③ **REMOTE/LOCAL switches (for PB CF, PB CF ADJ)**
These switches should be set to the same position.

④ **CHROMA level control**
The chroma level can be adjusted within a range of ±3 dB.

⑤ **SET UP level control**
The set up level can be adjusted within a range of ±15 IRE.

⑥ **VIDEO level control**
The video level can be adjusted within a range of ±3 dB.

⑦ **COMP/NON COMP switch**
The output signal of the VIDEO OUT connector on the BVH-2000/2180 is selected, composite video or non-composite video.

⑧ **H PHASE (system sync phase) control**
The H phase of the playback signal can be adjusted to that of the reference video signal. The adjustable range is −1 to +3 μs.

⑨ **SC (system sc phase) control**
The SC phase of the playback signal can be adjusted to that of the reference video signal. The adjustable range is 360° and more.

⑩ **HUE control**
The hue can be adjusted within a range of ±15°.

⑪ **REF CF ADJ (reference color framing adjustment) indicator (red)**
This indicator lights during adjustment of the color framing.

⑫ **REF CF NORM/ADJ (reference color framing normal/adjustment) switch**
To adjust the color framing, set this switch to ADJ; in other cases, set it to NORM.

⑬ **REF CF IN (reference color framing adjustment) indicator (green)**
This indicator lights to indicate the optimum SC-H phase of the reference video signal.

⑭ **REF CF (reference color framing) control**
The SC-H phase of the reference video signal can be adjusted.

⑮ **CHROM NORM/OFF (chroma normal/off) switch**
Usually set the switch to NORM. At the OFF position, the chrominance signal of the video singal is cut off.

⑯ **Y (luminance) ADD ON/OFF switch**
At the ON position, a luminance signal is added by line to maintain the interleave of the output signal, when the field relation is reversed during dynamic tracking playback.
At the OFF position, luminance signal is not added.

⑰ **PB CF (off tape video color framing) control**
The SC-H phase of the off tape video signal can be adjusted.

⑱ **PB CF IN (off tape video color framing adjustment) indicator**
This indicator lights to indicate the optimum SC-H phase of the off tape video signal.

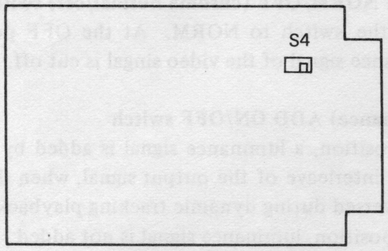
⑲ **PB CF NORM/ADJ (off tape color framing normal/adjustment) switch**
To adjust the color framing of the off tape video signal, set this switch to ADJ; in other cases, set the switch to NORM.

⑳ **PB CF ADJ (off tape color framing adjustment) indicator**
This indicator lights while the color framing of the off tape video signal is being adjusted.

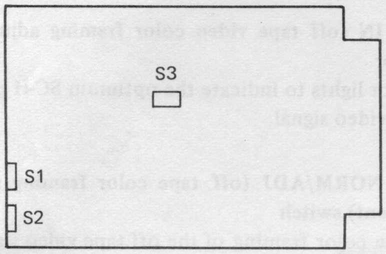
1\. OPERATION

1-5-2. On the Boards

AD-20 board



MY-21 board



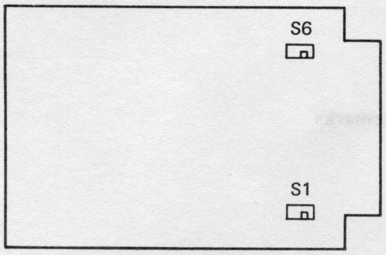
S4: At the ON position, the noise is not included in the TBC output signal if the STANDBY lamp goes out when the TAPE/EE selector on the VTR is set to TAPE. At the OFF position, the DEMOD OUT signal including the noise is output.

S1: At the OFF position, the chrominance signal of the output video signal is cut off, and the red LED is lit.

S2: At the ON position, the luminance signal is added by line when the field of the playback signal and the reference signal are not the same during dynamic tracking playback. At the OFF position, the signal is not added. In vertical blanking, no signal is added regardless of the switch position.

S3: The drop out compensator is turned on and off. Be sure to set to ON.

SG-10 board



S1: At the ON position, the sync signal of the TBC output signal is delayed by 4 H against the reference signal in the preview mode so that the relative phase of the video and sync signals will be the same. At the OFF position, the sync signal of the TBC output signal is synchronized with the reference signal so that the video signal is shifted by 2 through 6 H vertically.

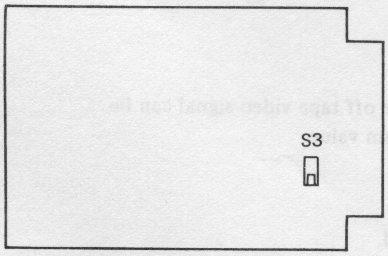
S6: At the ON position, the sync signal of the TBC output signal is delayed by 4 H from the reference signal in the E-to-E mode so that the relative phase of the video and sync signal will be the same.
At the OFF position, the sync signal of the TBC output signal is synchronized with the reference signal so that the video signal is shifted by 4 H vertically.

Operation at each switch setting is shown below.
When the signal whose video and sync signal are delayed by 4 H is monitored on a picture monitor in the internal sync mode, the vertical shift of the picture does not occur in the preview mode so that a normal picture can be monitored.

Switch	S1		S6	
	ON	OFF	ON	OFF
PLAY (EDIT preset)	Sync and video signal is delayed by 4 H.	Sync signal is delayed by 0 H, and video signal is delayed by 2 to 6 H.	Not related	
E-to-E	Not related		Sync and video signal is delayed by 4 H.	Sync signal is delayed by 0 H, and video signal is delayed by 4 H.

- The amount of delay of the TBC output signal against the reference signal is shown.

PR-64 board



S3: At the ON position, the color burst signal is added to the TBC output signal except when the servo reference signal does not include the color burst signal. At the OFF position, the color burst signal is not added.

1-6. ADJUSTMENTS

Adjusting the color framing (the optimum SC-H phase) of the reference signal

Operation	Remarks
Connect the reference signal.	
↓	
Adjust the H PHASE control and the SC control.	
↓	
Set the REF CF NORM/ADJ switch ⑫ to ADJ.	Adjustment begins. The REF CF ADJ indicator (red) ⑪ is lit during adjusting.
↓	
Turn the REF CF ADJ control ⑭ so that the REF CF ADJ indicator (green) ⑬ lights.	The SC-H phase of the reference signal can be adjusted to the optimum value.
↓	
Set the REF CF NORM/ADJ switch to NORM.	Adjustment completed. The REF CF ADJ indicator goes off.

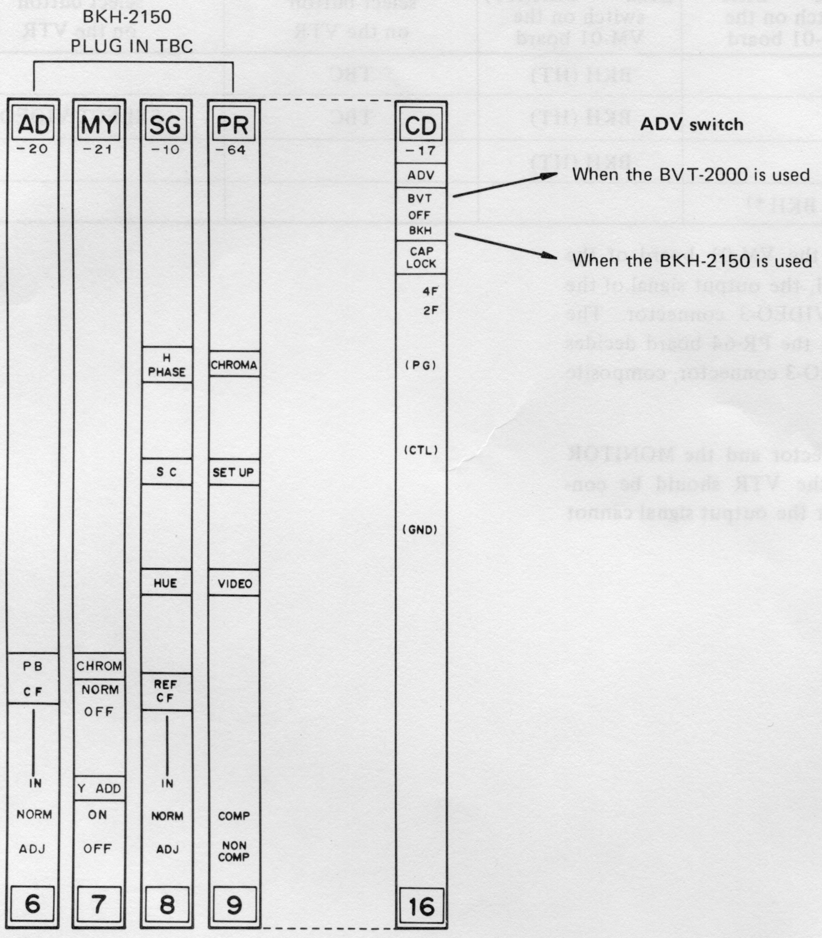
Adjusting the color framing (the optimum SC-H phase) of the off tape video signal

Operation	Remarks
Play the tape back with a normal speed in forward direction.	
↓	
Set the PB CF NORM/ADJ switch ⑲ to ADJ.	Adjustment begins. The PB CF ADJ indicator (red) ⑳ is lit during adjustment.
↓	
Turn the PB CF control ⑰ so that the PB CF IN indicator ⑱ lights.	The SC-H phase of the off tape video signal can be adjusted to the optimum value.
↓	
Set the PB CF NORM/ADJ switch ⑲ to NORM.	Adjustment completed. The PB CF ADJ indicator goes off.

1-7. OPERATION

Selection of phase advance

Set the ADV switch on the CD-17 board of the BVH-2000/2180 to BKH. The drum phase advances by 8.5 H against the reference sync.



AMP CHASSIS

Setting of the REMOTE/LOCAL switch

Set the REMOTE/LOCAL switches ①, ②, ③ on the AD-20, SG-10 and the PR-64 boards to LOCAL.

Note

When the BK-2006 (optional) is used, set the REMOTE/ LOCAL switch on the AD-20 board to LOCAL.

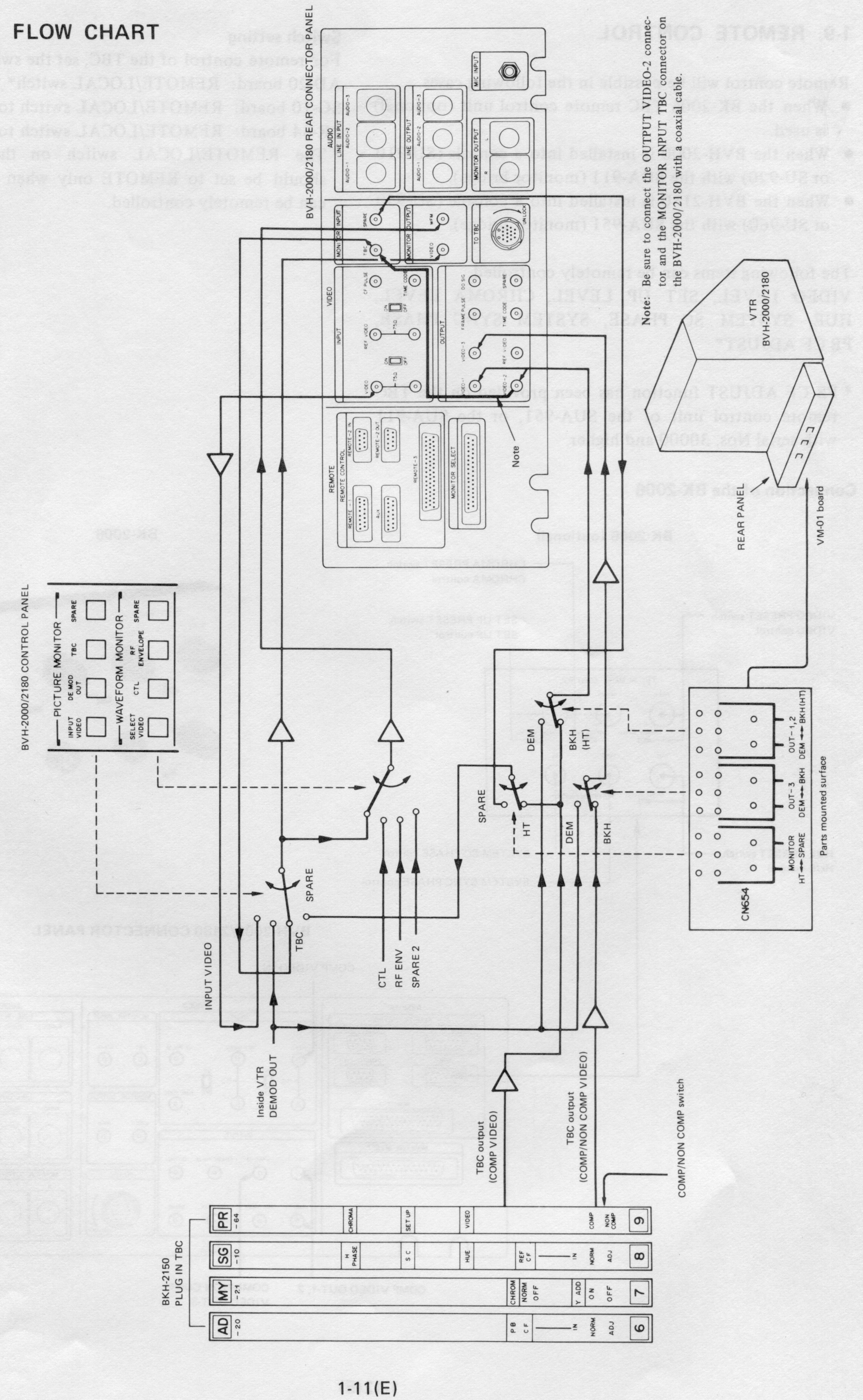
Selection of the TBC OUT

OUTPUT	OUT-3 DEM ↔ BKH switch on the VM-01 board	OUT-1, 2 DEM ↔ BKH(HT) switch on the VM-01 board	PICTURE MONITOR select button on the VTR	WAVEFORM MONITOR select button on the VTR
MONITOR VIDEO*2		BKH (HT)	TBC	
MONITOR WFM *2		BKH (HT)	TBC	SELECT VIDEO
VIDEO-1, VIDEO-2		BKH (HT)		
VIDEO-3	BKH *1			

*1 When the OUT-3 switch on the VM-01 board of the BVH-2000/2180 is set to BKH, the output signal of the BKH-2150 is fed from the VIDEO-3 connector. The COMP/NON COMP switch on the PR-64 board decides the output signal of the VIDEO-3 connector, composite signal or non-composite signal.

*2 The OUTPUT VIDEO-2 connector and the MONITOR INPUT TBC connector on the VTR should be connected with a coaxial cable, or the output signal cannot be obtained.

1-8. SIGNAL FLOW CHART



1-9. REMOTE CONTROL

Remote control will be possible in the following cases.

- When the BK-2006 TBC remote control unit (optional) is used.
- When the BVH-2000 is installed into a console (SU-910 or SU-920) with the SUA-911 (monitor bridge).
- When the BVH-2180 is installed into a console (SU-950 or SU-960) with the SUA-951 (monitor bridge).

The following items can be remotely controlled.
VIDEO LEVEL, SET UP LEVEL, CHROMA LEVEL, HUE, SYSTEM SC PHASE, SYSTEM SYNC PHASE, PB CF ADJUST*

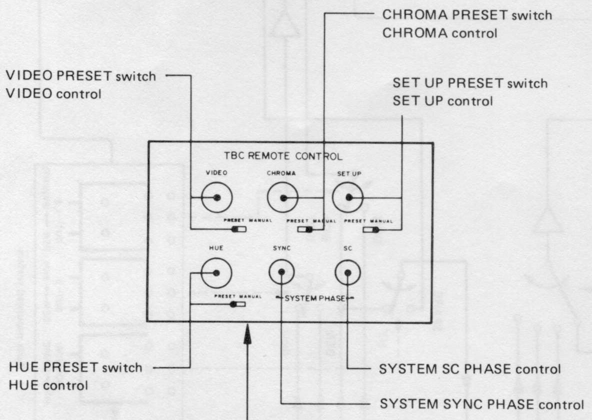
* PB CF ADJUST function has been provided on the TBC remote control unit of the SUA-951, or the SUA-911 with serial Nos. 30000 and higher.

Switch setting

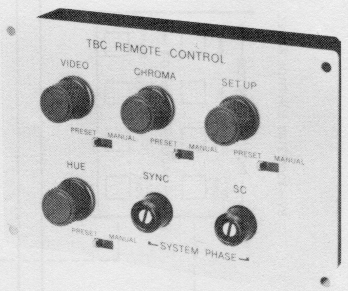
For remote control of the TBC, set the switches as follows:
AD-20 board: REMOTE/LOCAL switch* to REMOTE
SG-10 board: REMOTE/LOCAL switch to REMOTE
PR-64 board: REMOTE/LOCAL switch to REMOTE
* The REMOTE/LOCAL switch on the AD-20 board should be set to REMOTE only when the PB CF ADJ can be remotely controlled.

Connection of the BK-2006

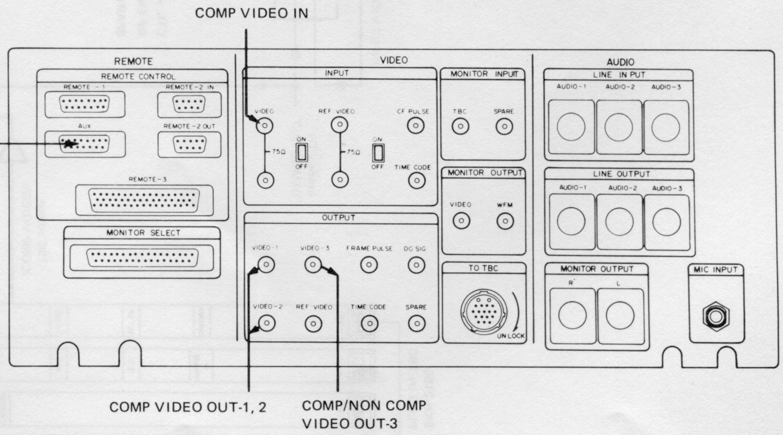
BK-2006 (optional)



BK-2006



BVH-2000/2180 CONNECTOR PANEL



第2章
設置およびサービスインフォメーション

2-1. 調整

BKH-2150をVTRにセットした時には，2-1-1～2-1-4の調整を必ず行なう。2-1-5～2-1-10の調整は必要に応じて行なう。

2-1-1. ペデスタルレベルオフセット調整

測定器； オシロスコープ
VTRのモード；EE
入力信号(VIDEO IN)；
カラービデオ信号

調整

SECTION 2
INSTALLATION AND SERVICE INFORMATION

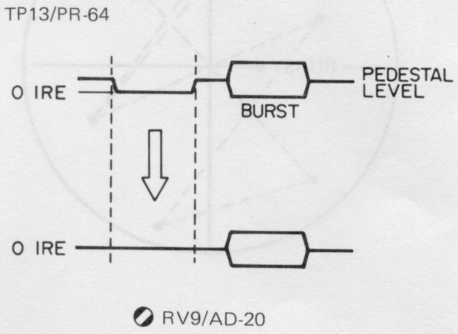
2-1. ADJUSTMENTS

When the BKH-2150 is installed in VTR, perform the adjustments, 2-1-1 to 2-1-4.
The adjustments 2-1-5 to 2-1-10 should be performed, if necessary.

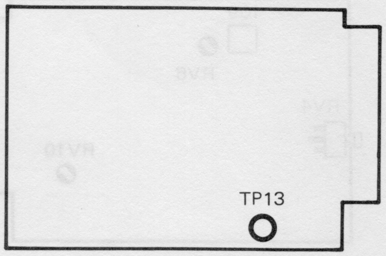
2-1-1. Pedestal Level Offset Adjustment

Equipment; Oscilloscope
Mode of VTR; EE
Input Signal (VIDEO IN);
Color Video Signal

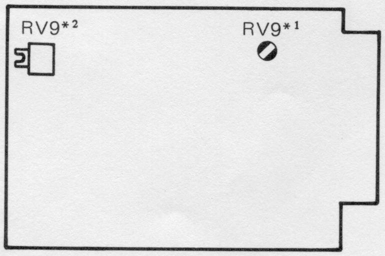
Adjustment



PR-64 Board



AD-20 Board



*1: For Board No. 1-615-701-11
*2: For Board No. 1-615-701-12

2-1-2. ベロシティエラー・オフセット調整

測定器；　　　ベクトルスコープ
VTRのモード；EE
入力信号（VIDEO IN）；
　　　　　　　ハーフレッド・カラーバー信号

調整

θを最小にする。

⊘ RV10/SG-10

2-1-2. Velocity Error Offset Adjustment

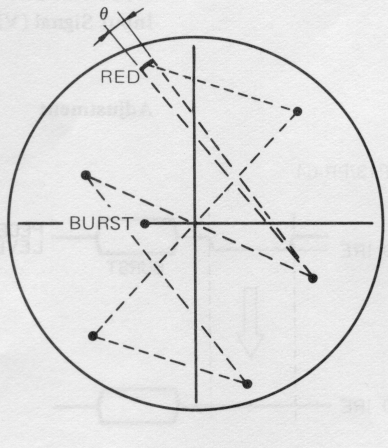
Equipment; Vectorscope
Mode of VTR; EE
Input Signal (VIDEO IN);
Half-Red Color Bar Signal

Adjustment

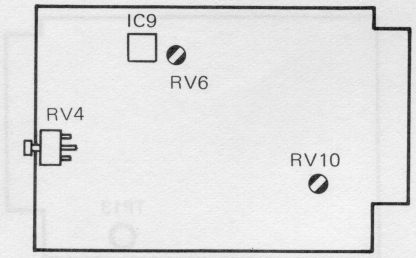
Minimize the θ.

⊘ RV10/SG-10

VIDEO OUT-1/VTR



SG-10 Board



2-1-3. HUEコントロールのプリセッティング

測定器；　ベクトルスコープ
VTRのモード；EE
入力信号(VIDEO IN)；
カラーバー信号

Step 1. スイッチの設定
HUE REMOTE/LOCAL SW (SG-10)：LOCAL

Step 2. ローカルHUEの設定
IC9 pin1/SG-10＝OV
RV4/SG-10，HUEコントロール

Step 3. HUEプリセッティング
BURST-YELLOW位相を下図のように調整する。

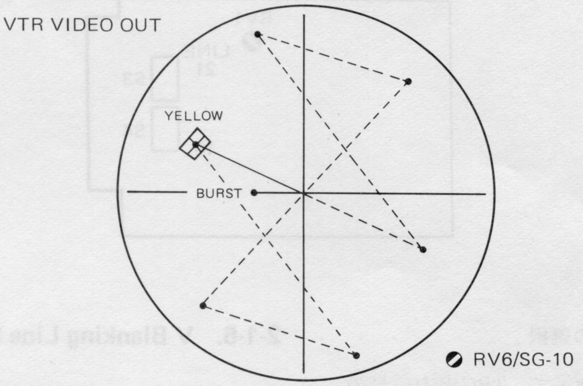
2-1-3. HUE Control Presetting

Equipment; Vectorscope
Mode of VTR; EE
Input Signal (VIDEO IN);
Color Bar Signal

Step 1. Switch Setting
HUE REMOTE/LOCAL sw (SG-10): LOCAL

Step 2. LOCAL HUE Control Setting
IC9 pin 1/SG-10=0 V
RV4/SG-10, HUE Control

Step 3. HUE Presetting
Set the BURST-YELLOW phase as below.



2-1-4. SYNC，バーストレベル調整

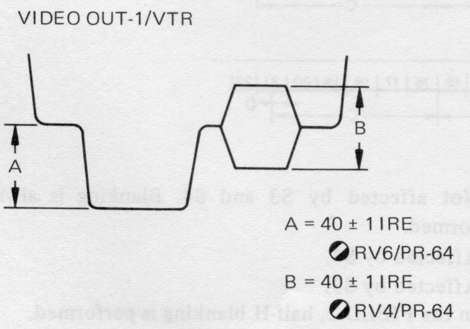
測定器；　波形モニター
VTRのモード；EE
入力信号(VIDEO IN)；
カラービデオ信号

調整

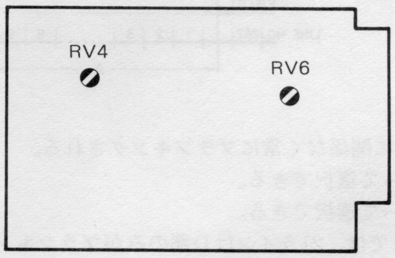
2-1-4. SYNC and Burst Level Adjustment

Equipment; Waveform Monitor
Mode of VTR; EE
Input Signal (VIDEO IN);
Color Video Signal

Adjustment



PR-64 Board

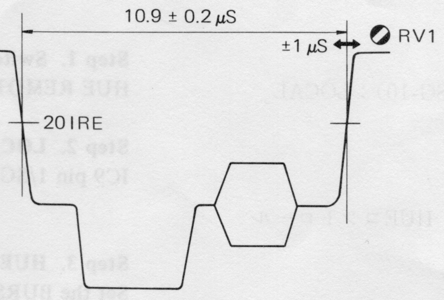


2-1-5. Hブランキング幅調整

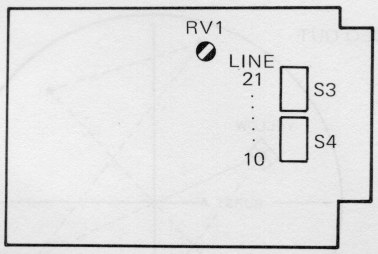
SG-10基板のRV1によって，TBC出力のHブランキング幅を約±1 μs加減できる。

2-1-5. H Blanking Width Adjustment

The H blanking width of the TBC output signal can be varied approximately +/−1 μs by RV1 on the SG-10 board.



SG-10 Board



2-1-6. Vブランキングラインの選択

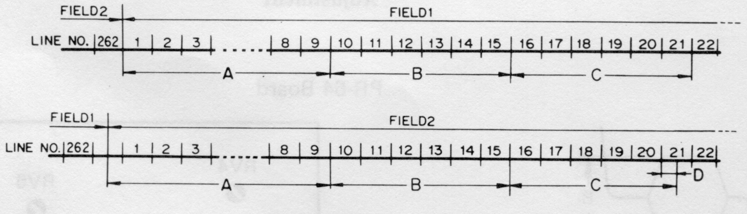
SG-10基板のスイッチS3，S4によって，TBC出力信号の10ラインから21ラインまでの任意のラインのブランキングを設定できる。

工場出荷時のS3，S4の設定
- S4；10〜15ライン ON
- S3；16〜20ライン ON
- 　　21ライン OFF

2-1-6. V Blanking Line Selection

The V Blanking of any line up to lines 10-21 of the TBC output can be turned ON/OFF by switches S3 and S4 on the SG-10 board.

S3, S4 setting at the factory
- S4; Lines 10 to 15 ON
- S3; Lines 16 to 20 ON
- Line 21 OFF



A；S3，S4に関係なく常にブランキングされる。
B；S4によって選択できる。
C；S3によって選択できる。
D；FIELD2では，21ラインはD部のみがブランキングされる。

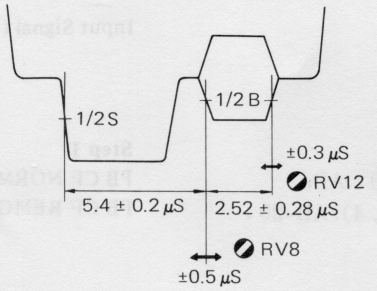
A; Not affected by S3 and S4. Blanking is always performed.
B; Affected by S4.
C; Affected by S3.
D; In the FIELD 2, half-H blanking is performed.

2-1-7. バースト位置・幅調整

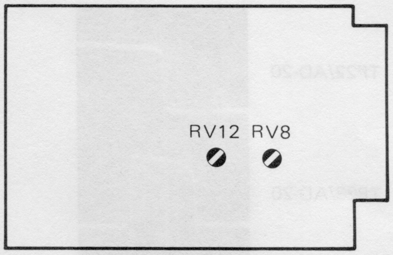
PR-64基板のRV8，RV12によって，TBC出力のバースト信号の位置(RV8)，幅(RV12)を調整できる。

2-1-7. Burst Position/Width Adjustment

The burst position and width of the TBC output can be varied by RV8 (position) and RV12 (width) on the PR-64 board.



PR-64 Board



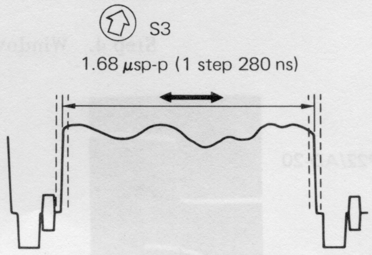
2-1-8. ビデオ位相調整

AD-20基板のロータリースイッチS3によって，TBC出力のビデオ位相を1ステップ280 nsで7ステップ(1.68 μs p-p)まで加減できる。

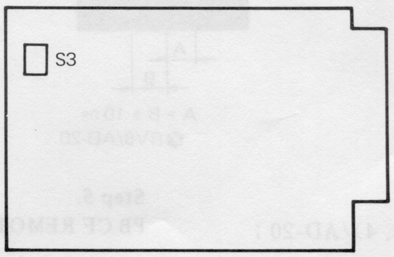
2-1-8. Video Phase Adjustment

The video phase of the TBC output signal can be varied 1.68 μsp-p by rotary switch S3 on the AD-20 board.

S3: 1 step 280 ns, 7 step



AD-20 Board



2-1-9. PB CF WINDOW調整

接　続；　5-3項，接続1参照。
測定器；　オシロスコープ
VTRのモード；PB(アライメントテープ使用)
スイッチ，ボリウムのセッティング；
　5-5項と同様。
入力信号(VIDEO IN)；
　バースト付ビデオ信号

2-1-9. PB CF Window Adjustment

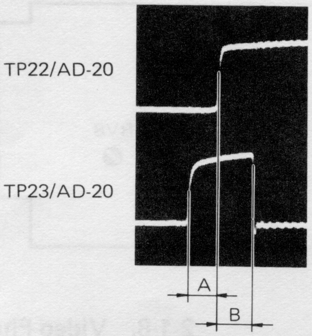
Connection; See section 5-3 connection 1.
Equipment; Oscilloscope
Mode of VTR; PB (Use Alignment Tape)
Switch & Control Setting;
　The Same as the Initial Setting
Input Signal (VIDEO IN);
　Any Signal with Burst

Step 1.
PB CF NORM/ADJ sw (S2)/AD-20；ADJ
PB CF REMOTE/LOCAL sw (S1-3, 4)/AD-20；
　LOCAL

Step 1.
PB CF NORM/ADJ sw (S2)/AD-20; ADJ
PB CF REMOTE/LOCAL sw (S1-3,4)/AD-20; LOCAL

Step 2. WINDOW位相調整-1

Step 2. Window Phase Adjustment -1



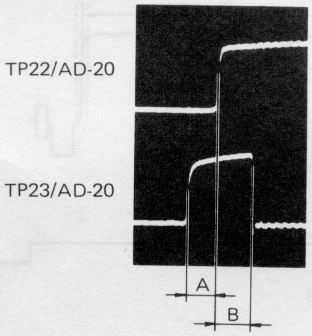
$\frac{B}{A} = 1.0 \pm 0.1$
⊘PB CF CONT (RV1)/AD-20

Step 3.
PB CF NORM/ADJ sw (S2)/AD-20；NORM

Step 3.
PB CF NORM/ADJ sw (S2)/AD-20; NORM

Step 4. WINDOW位相調整-2

Step 4. Window Phase Adjustment -2



A = B ± 10 ns
⊘RV8/AD-20

Step 5.
PB CF REMOTE/LOCAL sw (S1-3, 4)/AD-20；
　REMOTE

Step 5.
PB CF REMOTE/LOCAL sw (S1-3,4)/AD-20; REMOTE

2-1-10. 基板交換時の調整

AD-20基板またはSG-10基板を交換した場合は，次の調整が必要。

Step 1. ベロシティエラーオフセット調整
測定器； ベクトルスコープ，TV信号発生器
VTRのモード；EE
入力信号(VIDEO IN)；
カラーフィールドまたはハーフレッド信号

SG-10基板のRV10によって，VTR入力信号に対応したカラースポットを最小にする。（ハーフレッド信号の場合はREDスポット）

Step 2. ベロシティエラーゲイン調整
測定器； ベクトルスコープ
VTRのモード；ノーマル再生(カラーバー信号)

SG-10基板のRV14によって，TBC出力信号のBLUEスポットを最小にする。

2-1-10. Adjustment after Board Replacement

When the AD-20 or SG-10 board is replaced, the adjustment should be performed as below.

Step 1. Velocity Error Offset Adjustment
Equipment; Vectorscope,
NTSC Test Signal Generator

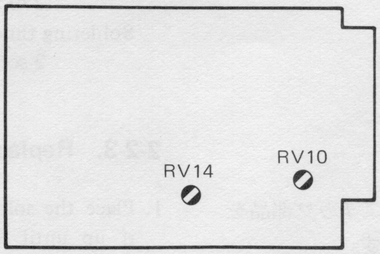
Mode of VTR; EE
Input Signal (VIDEO IN);
Color Field or Half-Red Signal

Minimize the color spot size by RV10 on the SG-10 board. When VTR input signal is half-red, minimize the red color spot.

Step 2. Velocity Error Gain Adjustment
Equipment; Vectorscope
Mode of VTR; Normal Play (Color Bar)

Minimize the BLUE spot size by RV14 on the SG-10 board.

SG-10 Board

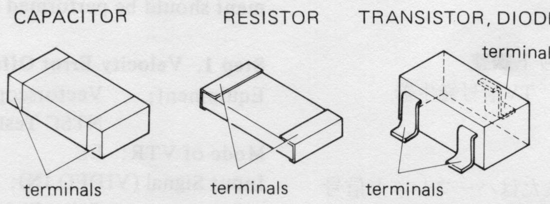


注：Step 1，2の観測点はVTRのVIDEO OUT.

Note; Step 1, 2 observation point: VTR VIDEO OUT

2-2. チップ部品の交換方法

2-2. REPLACEMENT PROCEDURE OF CHIP PART



2-2-1. 用意する工具

半田ゴテ　　：20W程度。できれば，コテの温度を270±10℃にコントロールできる温度コントローラーを使う。

編組線　　　：SOLDER TAULまたは同等品
ソニー部品番号7-641-300-81

半田ピンセット：直径0.6mmが望ましい。

2-2-2. 半田付条件

コテ温度　　：270±10℃

半田付時間　：一端子について２秒以内

2-2-3. 抵抗，コンデンサーの交換

1. 半田ゴテの先をチップ部品の上にのせてチップ部品を加熱し，半田が溶けた状態で横にずらす。
2. 取り外した部品のパターンはがれ，隣接半田付部のダメージ，ブリッジなどがないことを確認する。
3. パターンにうすく予備半田する。
4. 新しいチップ部品をパターンにのせ，両端を半田付けする。

注意：取り外したチップ部品は再び使わないこと。

2-2-1. Required Tools

Soldering iron 20W:
If possible, use the soldering-iron tip heat-controller at 270 ± 10°C.

Braided wire:
SOLDER TAUL or equivalent
Sony Part No. 7-641-300-81

Solder: 0.6 mm dia. is recommended.

Tweezers

2-2-2. Soldering Conditions

Soldering iron temperature:
270 ± 10°C

Soldering time:
2 seconds per a pin

2-2-3. Replacement of Resistor and Capacitor

1. Place the soldering-iron tip onto the chip part and heat it up until the solder is melted. When the solder is melted, slide the chip part aside.
2. Make sure that there is no pattern peeling, damage and/or bridge around the desoldering positions.
3. After removing the chip part, presolder the area, in which the new chip part is to be placed, with a thin layer of solder.
4. Place new chip part in the desired position and solder both ends.

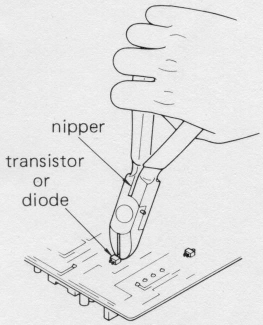
CAUTION
Do not use the chip part again once it has been removed.

2-2-4. トランジスタ，ダイオードの交換

1. ニッパーにて部品の端子を切断する。
2. 切断した端子を半田ゴテで取り除く。
3. 取り除いた部分のパターンはがれ，隣接半田付部のダメージ，ブリッジなどがないことを確認する。
4. パターンにうすく予備半田する。
5. 新しいチップ部品をパターンにのせ，端子を半田付けする。

2-2-4. Replacement of Transistor and Diode

1. Cut the terminals of the chip part with nippers.
2. Remove the leads cut as above.
3. Make sure that there is no pattern peeling, damage and/or bridge around the desoldering positions.
4. After removing the chip part, presolder the area, in which the new chip part is to be placed, with a thin layer of solder.
5. Place new chip part in the desired position and solder the terminals.



2-2-5. ICの交換

1. 編組線を使って端子の半田を取り除く。
2. 半田ゴテで加熱しながら，ピンセットなどを使って端子を一本づつパターンから外し，ICを取り除く。
3. 取り除いた部分のパターンはがれ，隣接半田付部のダメージ，ブリッジなどがないことを確認する。
4. パターンにうすく予備半田する。
5. 新しい部品をパターンにのせ，端子を半田付する。

2-2-5. Replacement of IC

1. Using the braided wire, “SOLDER TAUL” Sony Part No. 7-641-300-81, remove the solder around the pins of the IC-chip to be removed.
2. While heating up the pins, remove the pins one by one using sharp-pointed tweezers.
3. Make sure that there is no pattern peeling, damage and/or bridge around the desoldering positions.
4. After removing the chip part, presolder the area, in which the new chip part is to be placed, with a thin layer of solder.
5. Place new chip part in the desired position and solder the pins.

第4章

調整のための一般情報

SECTION 4
GENERAL INFORMATION FOR ALIGNMENT

4-1. 調整部品索引

4-1. INDEX OF ALIGNMENT COMPONENTS

AD-20 Board	Section		Section
LV1			6-2-3
LV2			7-2-12
LV3			7-2-12
RV1 PB CF CONTROL			5-5
RV2	6-2-2	RV10	7-1-4
RV4	6-2-7	RV11	7-2-11
RV5	6-2-6	RV12	7-1-1
RV6	6-2-1	RV13	7-1-2
RV8	7-2-13	RV15	6-2-5
RV9	7-1-3, 7-2-1	RV16	6-2-4

SG-10 Board	Section		Section
LV1	6-3-4	RV1	6-1-4
RV2 H PHASE CONTROL			5-5
RV3 SC PHASE CONTROL			5-5
RV4 HUE CONTROL			7-2-12
RV5 REF CF CONTROL			5-5
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RV7	6-1-2	RV12	6-3-1
RV8	6-1-3	RV13	7-2-12
RV9	6-1-5	RV14	6-3-3
RV10	6-3-2	RV15	6-1-1

PR-64 Board	Section		Section
RV1 CHROMA LEVEL CONTROL			5-5
RV2 SET UP LEVEL CONTROL			7-2-2
RV3 VIDEO LEVEL CONTROL			5-5
RV4	7-2-9	RV9	7-2-6
RV5	7-2-7	RV10	7-2-4
RV6	7-2-10	RV11	7-2-3
RV7	7-2-2	RV12	7-2-8
RV8	7-2-8	RV13	7-2-5

4-2. 調整順序

6-1-1～6-1-5 (SG-10)
シンクジェネレーター調整
↓
6-2-1～6-2-7 (AD-20)
ライトクロックジェネレーター調整
A/Dコンバーター調整
↓
6-3-1～6-3-5 (SG-10)
リードクロックジェネレーター調整
↓
7-1-1～7-1-4 (AD-20)
A/Dコンバーター調整
↓
7-2-1～7-2-10 (PR-64)
プロセッサー調整
↓
7-2-11～7-2-14 (AD-20, SG-10)
総合調整

4-2. ALIGNMENT SEQUENCE

6-1-1 to 6-1-5 (SG-10)
SYNC GENERATOR ALIGNMENT
↓
6-2-1 to 6-2-7 (AD-20)
WRITE CLOCK GENERATOR ALIGNMENT
A/D CONNECTOR ALIGNMENT
↓
6-3-1 to 6-3-5 (SG-10)
READ CLOCK GENERATOR ALIGNMENT
↓
7-1-1 to 7-1-4 (AD-20)
A/D CONVERTER ALIGNMENT
↓
7-2-1 to 7-2-10 (PR-64)
PROCESSOR ALIGNMENT
↓
7-2-11 to 7-2-14 (AD-20, SG-10)
OVERALL ALIGNMENT

第5章
調整前の準備

5-1. 使用機器

1. NTSC信号発生器
ソニーテクトロニクス1410型又は相当品

plug-in Unit	SYNC GENERATOR	SPG 2
	COLOR BAR GEN.	TSG 1
	LINEARITY GEN.	TSG 3
	PULSE&BAR GEN.	TSG 5
	MULTIBURST AND VIDEO SWEEP GEN.	TSG6

信号の規格に関しては5-2章参照。

2. NTSCベクトルスコープ
ソニーテクトロニクス520A型又は相当品

3. オシロスコープ
ソニーテクトロニクス465B型又は相当品

4. デジタル電圧計
有効桁数；5桁以上
精　　度；0.02%，±1カウント以下

5. VTR
ソニーBVH-2000

6. 延長基板；EB-10（BVH-2000に1枚付属）
ソニー部品番号 A-6001-005-A

7. 基準テープ；BR5-2NTSC
ソニー部品番号 8-944-005-02

8. 空リール

9. ICテストクリップ
TC-16 ソニー部品番号 J-6041-770-A
TC-20 ソニー部品番号 J-6041-780-A
製造元；AP PRODUCTS INCORPORATED
U.S.A.
輸入販売元；㈱常盤商行
140 東京都品川区南大井3-31-11 金沢ビル
TEL 03-766-6701

チェック，調整時にDIPタイプICの足にオシロスコープのプローブをかけるのに便利である。TC-16は14ピンまたは16ピンのDIP ICに，TC-20は18ピンまたは20ピンのDIP ICに使える。

SECTION 5
PREPARATION FOR ALIGNMENT

5-1. EQUIPMENT REQUIRED

1. NTSC Test Signal Generator
TEKTRONIX Type 1410 or Equivalent

Test Signal Module	SYNC GENERATOR	SPG2
	COLOR BAR GEN.	TSG1
	LINEARITY GEN.	TSG3
	PULSE & BAR GEN.	TSG5
	MULTIBURST AND VIDEO SWEEP GEN.	TSG6

Refer to section 5-2 for signal details.

2. NTSC Vectorscope
TEKTRONIX Type 520A or Equivalent

3. Oscilloscope
TEKTRONIX Type 465B or Equivalent

4. Digital Voltmeter
Effective digits: more than 4½ digits
Accuracy: less than 0.02% ±1 count

5. Video Tape Recorder
SONY BVH-2000

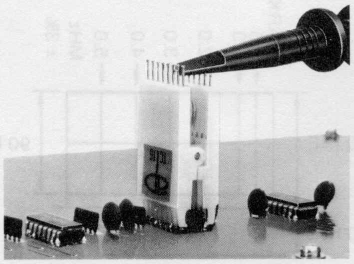
6. Extender; EB-10 (Supplied with BVH-2000)
SONY Part No. A-6001-005-A

7. Alignment Tape; BR5-2
SONY Part No. 8-944-005-02

8. Empty Reel

9. IC Test Clip
Type TC-16: SONY Part No. J-6041-770-A
Type TC-20: SONY Part No. J-6041-780-A
Manufacturer:
AP PRODUCTS INCORPORATED
P.O. Box 697. 72 Corwin Drive
Peinesville, Ohio 44077, U.S.A.
Tel: (216) 354-2101

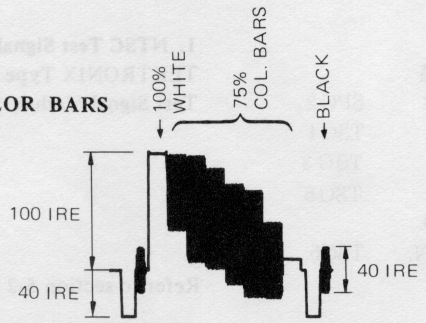
When connecting the test probe to the terminal of DIP integrated circuit, these clips are convenient. Type TC-16 is for DIP 14-pin or 16-pin IC and Type TC-20 is for 18-pin or 20-pin IC.



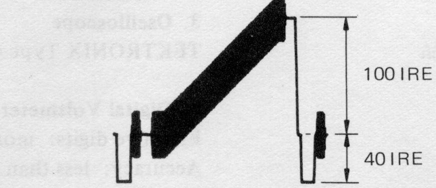
5-2. テスト信号

5-2. TEST SIGNALS

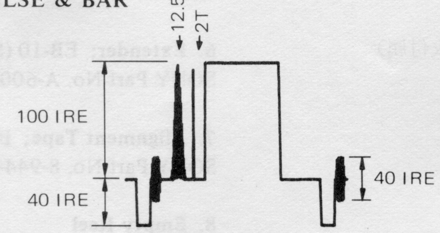
COLOR BARS



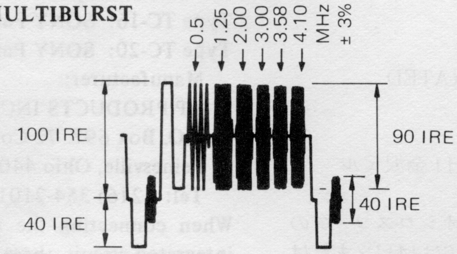
RAMP LINEARITY



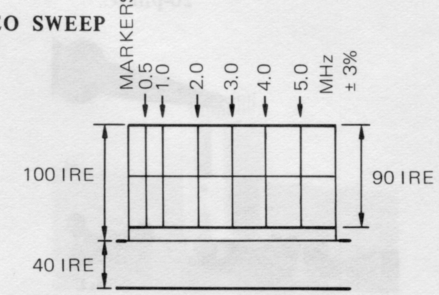
PULSE & BAR



MULTIBURST



VIDEO SWEEP

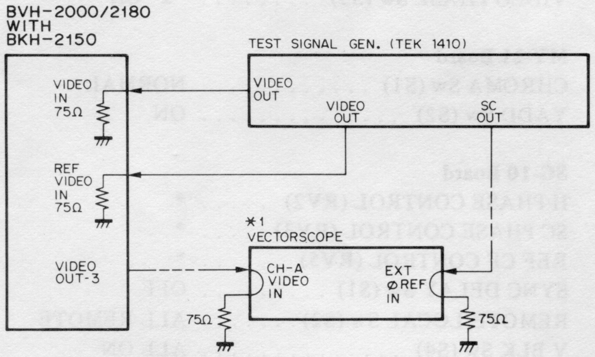


5-3. 機器の接続

5-3. CONNECTIONS

接続1

CONNECTION 1.



＊1. ベクトルスコープは，7-2-12項の調整に使用する。

*1. When performing the adjustments of section 7-2-12, prepare the Vectorscope.

5-4. VTRのセッティング

5-4. INITIAL SETTING OF VTR

5-4-1. レベルコントロールパネル部

5-4-1. Level Control Panel

REMOTE/LOCAL Sw . . . . LOCAL

5-4-2. ファンクションコントロールパネル部

5-4-2. Function Control Panel

TAPE/EE Sel . . . . TAPE/EE
SERVO REF Sel . . . . INPUT
HEAD Selector . . . . R/P

5-4-3. コネクターパネル部

5-4-3. Connector Panel

VM-01 Board
V-OUT 1, 2 DEM/BKH (HT) . . . . BKH (HT)
V-OUT 3 DEM/BKH . . . . BKH

5-4-4. その他のスイッチ，ボリュームのセッティング

5-4-1から5-4-3章で指示されていないスイッチ，ボリュームについては，ノーマル再生モードまたはAUTO E-Eモードが正常に動作できる位置に設定する。

5-4-4. Other Switch & Control Setting

As for the switch & control setting not designated in section 5-4-1 to 5-4-3, set them to the suitable position for NORM-PLAY or AUTO E-E mode.

5-5. BKH-2150のセッティング

5-5. INITIAL SETTING OF THE BKH-2150

AD-20 Board	
PB CF CONTROL (RV1)	*Mid-rotation
LOCAL/REMOTE Sw (S1)	REMOTE
PB CF ADJ Sw (S2)	NORMAL
VIDEO PHASE Sw (S3)	"2" ON
MY-21 Board	
CHROMA Sw (S1)	NORMAL
YADD Sw (S2)	ON
SG-10 Board	
H PHASE CONTROL (RV2)	*
SC PHASE CONTROL (RV3)	*
REF CF CONTROL (RV5)	*
SYNC DELAY Sw (S1)	OFF
REMOTE/LOCAL Sw (S2)	ALL REMOTE
V BLK Sw (S4)	ALL ON
V BLK Sw (S3)	Line 16 to 20: ON Line 21: OFF
REF CF Sw (S5)	NORMAL
SYNC DELAY Sw (S6)	OFF
PR-64 Board	
CHROMA LEVEL CONTROL (RV1)	*Mid-rotation
VIDEO LEVEL CONTROL (RV3)	*Mid-rotation
REMOTE/LOCAL Sw (S1)	ALL REMOTE
COMP/NON COMP Sw (S2)	COMP
BURST ON/OFF Sw (S3)	ON

5-6. リモートコントロールユニットのセッティング

BK-2006およびその他のリモートコントロールユニットを使用する場合は，スイッチ，コントロールを下記のようにセットする。

5-6. INITIAL SETTING OF REMOTE CONTROL UNIT

If the BK-2006 or other remote control unit (option) is used, set the switches and controls as follows.

VIDEO PRESET/MANUAL	PRESET
CHROMA PRESET/MANUAL	PRESET
SET UP PRESET/MANUAL	PRESET
HUE PRESET/MANUAL	PRESET
SYNC PHASE CONTROL	*Mid-rotation
SC PHASE CONTROL	*Mid-rotation

注意；
アスタリスク(*)を付けた部品はBKH-2150の調整に関係しません。

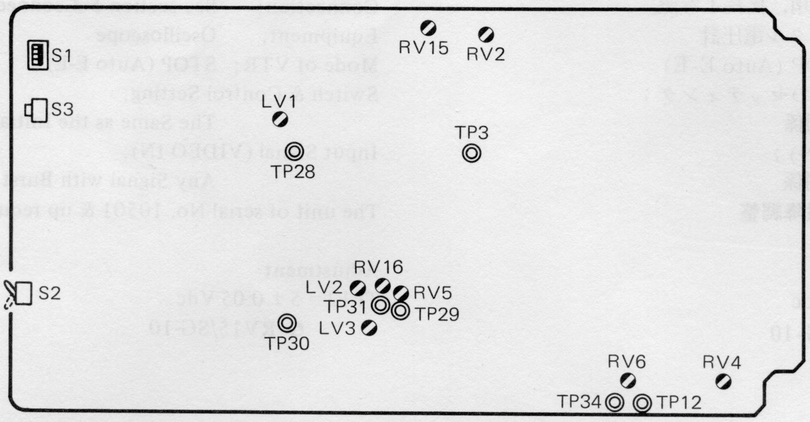
Note;
The components marked by asterisk (*) do not affect the adjustment of the BKH-2150.

5. PREPARATION FOR ALIGNMENT
5. 調整前の準備

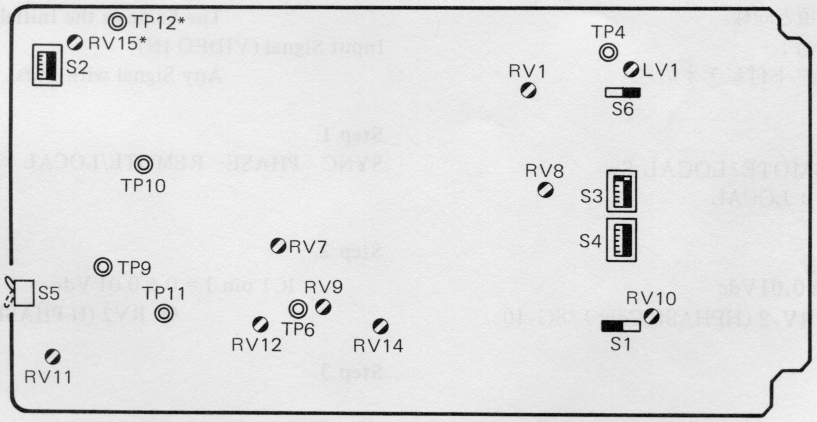
第6章
クロック·制御信号系調整

SECTION 6
CLOCK AND CONTROL SIGNAL SYSTEM ALIGNMENT

AD-20 Board



SG-10 Board



*RV15, TP12: Serial No. 10501 & UP

6-1. SYNCジェネレーター調整

6-1-1. +5V調整

接　続；　　5-3項，接続1参照。
測定器；　　デジタル電圧計
VTRのモード；STOP (Auto E-E)
スイッチ，ボリウムのセッティング；
　　無関係
入力信号 (VIDEO IN)；
　　無関係
シリアルNo. 10501 以降調整

調整
TP12 = 5 ± 0.05 Vdc
　　RV/5/SG-10

6-1-2. SYNC位相プリセット調整

接　続；　　5-3項，接続1参照。
測定器；　　オシロスコープ
VTRのモード；STOP (Auto E-E)
スイッチ，ボリウムのセッティング；
　　5-5項と同様。
入力信号 (VIDEO IN)；
　　バースト付ビデオ信号

Step 1.
SYNC PHASE REMOTE/LOCAL Sw
(S2 - 1.2/SG-10)：LOCAL

Step 2.
ICI pin1 = 0 ±0.01Vdc
　　RV-2 (HPHASE Cont) /SG-10

Step 3.

6-1. SYNC GENERATOR ALIGNMENT

6-1-1. +5 V Adjustment

Connection; See section 5-3 connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto E-E)
Switch & Control Setting;
The Same as the Initial Setting
Input Signal (VIDEO IN);
Any Signal with Burst
The unit of serial No. 10501 & up require this adjustment.

Adjustment
TP12 = 5 ± 0.05 Vdc
RV15/SG-10

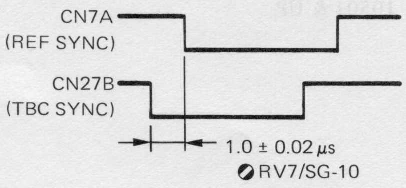
6-1-2. Sync Phase Preset Adjustment

Connection; See section 5-3 connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto E-E)
Switch & Control Setting;
The Same as the Initial Setting
Input Signal (VIDEO IN);
Any Signal with Burst

Step 1.
SYNC PHASE REMOTE/LOCAL Sw (S2-1,2/SG-10);
LOCAL

Step 2.
IC1 pin 1 = 0 ± 0.01 Vdc
RV2 (H PHASE Cont)/SG-10

Step 3.



Step 4.
SYNC PHASE REMOTE/LOCAL Sw
(S2-1.2/SG-10)：REMOTE

Step 4.
SYNC PHASE REMOTE/LOCAL Sw (S2-1,2/SG-10);
REMOTE

6-1-3. TBCフレーム信号位相調整

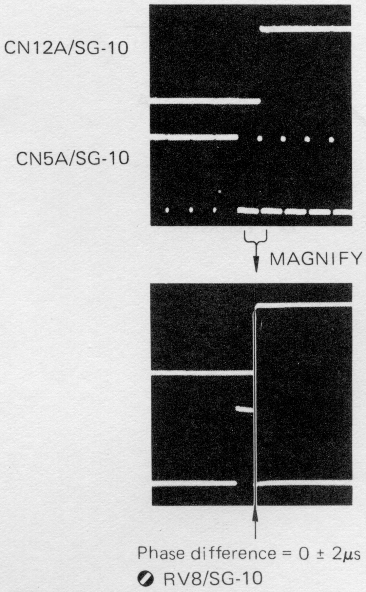
接　続；　5-3項，接続1参照。
測定器；　オシロスコープ
VTRのモード；STOP(Auto E-E)
スイッチ，ボリウムのセッティング；
5-5項と同様。
入力信号(VIDEO IN)；
バースト付ビデオ信号。

調整

6-1-3. TBC Frame Signal Phase Adjustment

Connection; See section 5-3 connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto E-E)
Switch & Control Setting;
The Same as the Initial Setting
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment



6-1-4. Hブランキングパルス幅調整

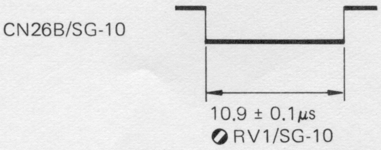
接　続；　5-3項，接続1参照。
測定器；　オシロスコープ
VTRのモード；STOP(Auto E-E)
スイッチ，ボリウムのセッティング；
5-5項と同様。
入力信号(VIDEO IN)；
バースト付ビデオ信号。

調整

6-1-4. H Blanking Pulse Width Adjustment

Connection; See section 5-3 connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto E-E)
Switch & Control Setting;
The Same as the Initial Setting
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment



6 - 1 - 5. SC位相変調器調整

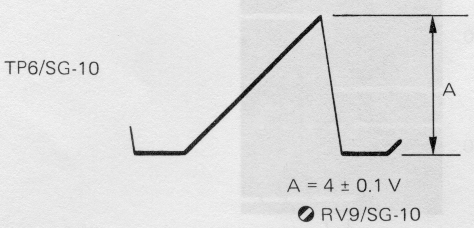
接　続；　　　5-3項，接続１参照。
測定器；　　　オシロスコープ
VTRのモード；STOP(Auto E-E)
スイッチ，ボリウムのセッティング；
　　　　　　　5-5項と同様。
入力信号(VIDEO IN)；
　　　　　　　バースト付ビデオ信号。

調整

6-1-5. SC Phase Shifter Adjustment

Connection; See section 5-3 connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto E-E)
Switch & Control Setting;
The Same as the Initial Setting
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment



6-2. ライトクロックジェネレーター調整

6-2-1. WINDOW位置調整

接　続；　5-3項，接続1参照。
測定器；　オシロスコープ
VTRのモード；STOP(Auto E-E)
スイッチ，ボリウムのセッティング；
　5-5項と同様。
入力信号(VIDEO IN)；
　バースト付ビデオ信号。

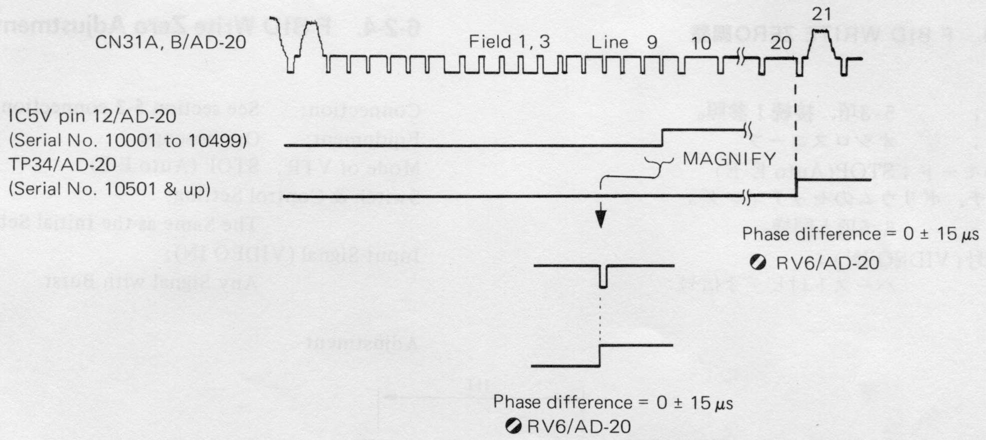
調整

6-2. WRITE CLOCK GENERATOR ALIGNMENT

6-2-1. Window Position Adjustment

Connection; See section 5-3 connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto E-E)
Switch & Control Setting;
The Same as the Initial Setting
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment



6-2-2. のこぎり波レベル調整

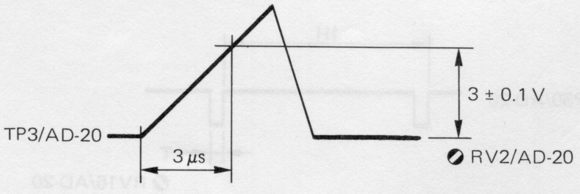
接　続；　5-3項，接続1参照。
測定器；　オシロスコープ
VTRのモード；STOP(Auto E-E)
スイッチ，ボリウムのセッティング；
　5-5項と同様。
入力信号(VIDEO IN)；
　バースト付ビデオ信号。

調整

6-2-2. Sawtooth Level Adjustment

Connection; See section 5-3 connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto E-E)
Switch & Control Setting;
The Same as the Initial Setting
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment



6-2-3. AFC VCO調整

接　続；　5-3項，接続1参照。
測定器；　オシロスコープ
VTRのモード；STOP(Auto E-E)
スイッチ，ボリウムのセッティング；
　5-5項と同様。
入力信号(VIDEO IN)；
　バースト付ビデオ信号。

調整

TP28/AD-20＝2±0.1Vdc
　⊘LV1/AD-20

6-2-3. AFC VCO Adjustment

Connection; See section 5-3 connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto E-E)
Switch & Control Setting;
The Same as the Initial Setting
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment

TP28/AD-20 = 2 ± 0.1 Vdc
⊘ LV1/AD-20

6-2-4. F BID WRITE ZERO調整

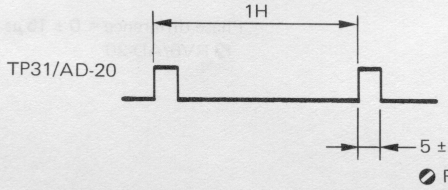
接　続；　5-3項，接続1参照。
測定器；　オシロスコープ
VTRのモード；STOP(Auto E-E)
スイッチ，ボリウムのセッティング；
　5-5項と同様。
入力信号(VIDEO IN)；
　バースト付ビデオ信号

調整

6-2-4. F BID Write Zero Adjustment

Connection; See section 5-3 connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto E-E)
Switch & Control Setting;
The Same as the Initial Setting
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment



6-2-5. VCOスタートパルス調整

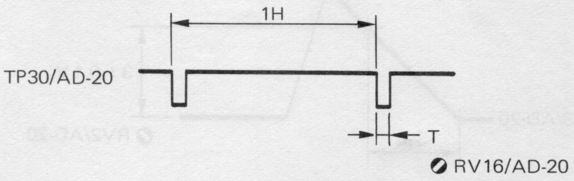
接　続；　5-3項，接続1参照。
測定器；　オシロスコープ
VTRのモード；STOP(Auto E-E)
スイッチ，ボリウムのセッティング；
　5-5項と同様。
入力信号(VIDEO IN)；
　バースト付ビデオ信号

調整

6-2-5. VCO Start Pulse Adjustment

Connection; See section 5-3 connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto E-E)
Switch & Control Setting;
The Same as the Initial Setting
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment



T = 2.6 ± 0.1 μs (Serial No. 10001 to 10499)
T = 6.0 ± 0.2 μs (Serial No. 10501 & UP)

6-2-6. WRITE ZERO調整

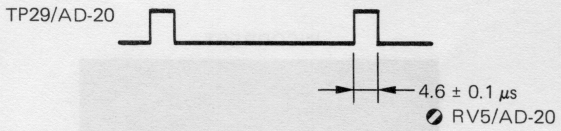
接　続；　　　5-3項，接続1参照。
測定器；　　　オシロスコープ
VTRのモード；STOP(Auto E-E)
スイッチ，ボリウムのセッティング；
　　　　　　　5-5項と同様。
入力信号(VIDEO IN)；
　　　　　　　バースト付ビデオ信号。

調整

6-2-6. Write Zero Adjustment

Connection; See section 5-3 connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto E-E)
Switch & Control Setting;
The Same as the Initial Setting
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment



6-2-7. WRITE V調整

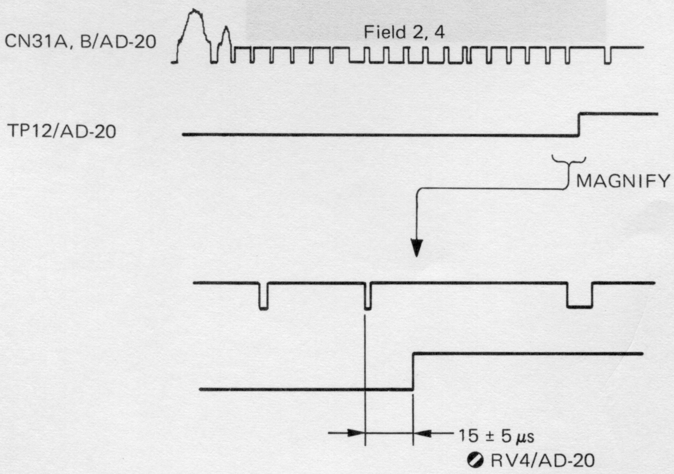
接　続；　　　5-3項，接続1参照。
測定器；　　　オシロスコープ
VTRのモード；STOP(Auto E-E)
スイッチ，ボリウムのセッティング；
　　　　　　　5-5項と同様。
入力信号(VIDEO IN)；
　　　　　　　バースト付ビデオ信号

調整

6-2-7. Write V Adjustment

Connection; See section 5-3 connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto E-E)
Switch & Control Setting;
The Same as the Initial Setting
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment



6-3. リードクロックジェネレーター調整

6-3-1. 波形デューティ調整

接　続；　　　5-3項，接続1参照。
測定器；　　　オシロスコープ
VTRのモード；STOP(Auto E-E)
スイッチ，ボリウムのセッティング；
　　　　　　　5-5項と同様。
入力信号(VIDEO IN)；
　　　　　　　バースト付ビデオ信号

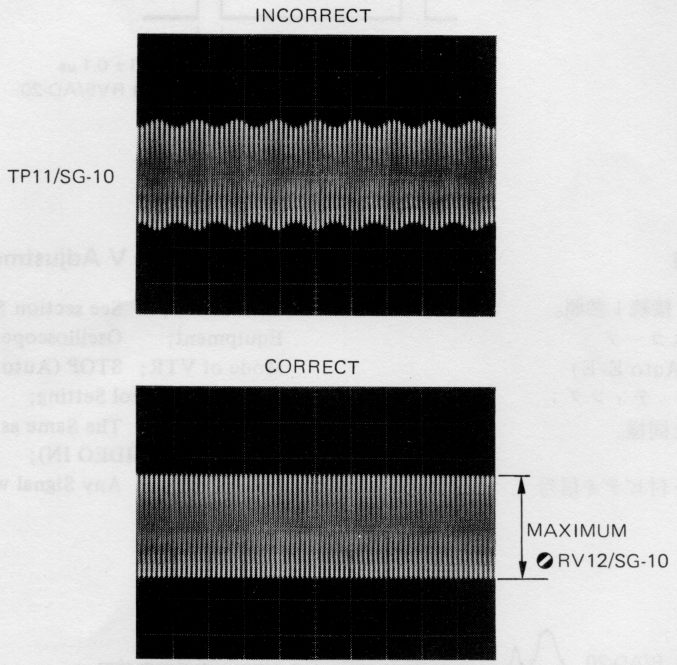
調整

6-3. READ CLOCK GENERATOR ALIGNMENT

6-3-1. Waveform Duty Adjustment

Connection; See section 5-3 connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto E-E)
Switch & Control Setting;
The Same as the Initial Setting
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment



6-3-2. ベロシティーエラーオフセット調整

接　続；　5-3項，接続1参照。
測定器；　ベクトルスコープ
VTRのモード；STOP(Auto E-E)
スイッチ，ボリウムのセッティング；
　5-5項と同様。
入力信号(VIDEO IN)；
　COLOR BARS(レッドリファレンス)

調整

ベクトルスコープ上のレッドスポットを最小にする。

⊘ RV10/SG-10

6-3-3. ベロシティーエラーゲイン調整

接　続；　5-3項，接続1参照。
測定器；　ベクトルスコープ
VTRのモード；PLAY
　(アライメントテープのCOLOR BARS使用)
スイッチ，ボリウムのセッティング；5-5項と同様。
入力信号(VIDEO IN)；
　無関係

調整

ベクトルスコープ上のブルースポットを最小にする。

⊘ RV14/SG-10

6-3-4. バーストチューニング調整

接　続；　5-3項，接続1参照。
測定器；　オシロスコープ
VTRのモード；STOP(Auto E-E)
スイッチ，ボリウムのセッティング；
　5-5項と同様。
入力信号(VIDEO IN)；
　バースト付ビデオ信号

調整

6-3-2. Velocity Error Offset Adjustment

Connection; See section 5-3 connection 1.
Equipment; Vectorscope
Mode of VTR; STOP (Auto E-E)
Switch & Control Setting;
The Same as the Initial Setting
Input Signal (VIDEO IN);
COLOR BARS (Red Reference)

Adjustment

Minimize the red spot on the vectorscope.

⊘ RV10/SG-10

6-3-3. Velocity Error Gain Adjustment

Connection; See section 5-3 connection 1.
Equipment; Vectorscope
Mode of VTR; PLAY (Color Bars of Alignment Tape)
Switch & Control Setting;
The Same as the Initial Setting
Input Signal (VIDEO IN);
Irrelevant

Adjustment

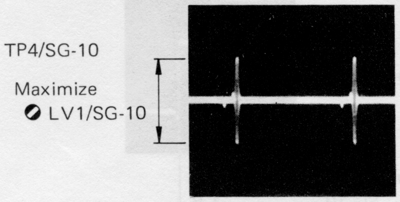
Minimize the blue spot on the vectorscope.

⊘ RV14/SG-10

6-3-4. Burst Tuning Adjustment

Connection; See section 5-3 connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto E-E)
Switch & Control Setting;
The Same as the Initial Setting
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment



6-3-5. REF CF WINDOW調整

接　続；　　5-3項，接続1参照。
測定器；　　オシロスコープ
VTRのモード；STOP(Auto E-E)
スイッチ，ボリウムのセッティング；
　　REF NORM/ADJ sw (S5)/SG-10；ADJ
入力信号(VIDEO IN)；
　　バースト付ビデオ信号

Step 1.
REF CF NORM/ADJ sw (S5)/SG-10；ADJ

Step 2. WINDOW位相調整-1

Step 3.
REF CF NORM/ADJ sw (S5)/SG-10；NORM

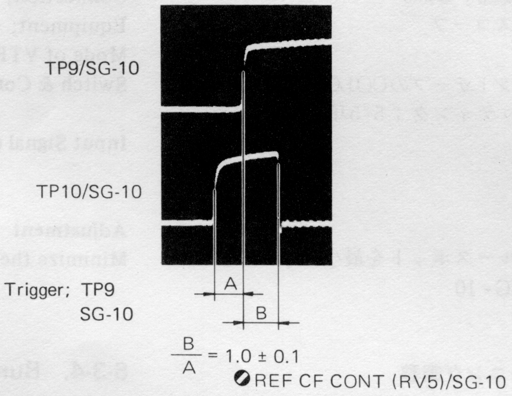
Step 4. WINDOW位相調整-2

6-3-5. REF CF Window Adjustment

Connection; See section 5-3 connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto E-E)
Switch & Control Setting;
REF CF NORM/ADJ sw (S5)/SG-10; ADJ
Input Signal (VIDEO IN);
Any Signal with Burst

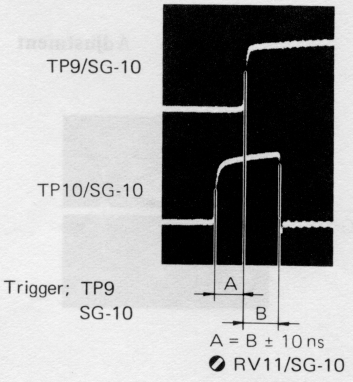
Step 1.
REF CF NORM/ADJ sw (S5)/SG-10; ADJ

Step 2. **Window Phase Adjustment -1**



Step 3.
REF CF NORM/ADJ sw (S5)/SG-10; NORM

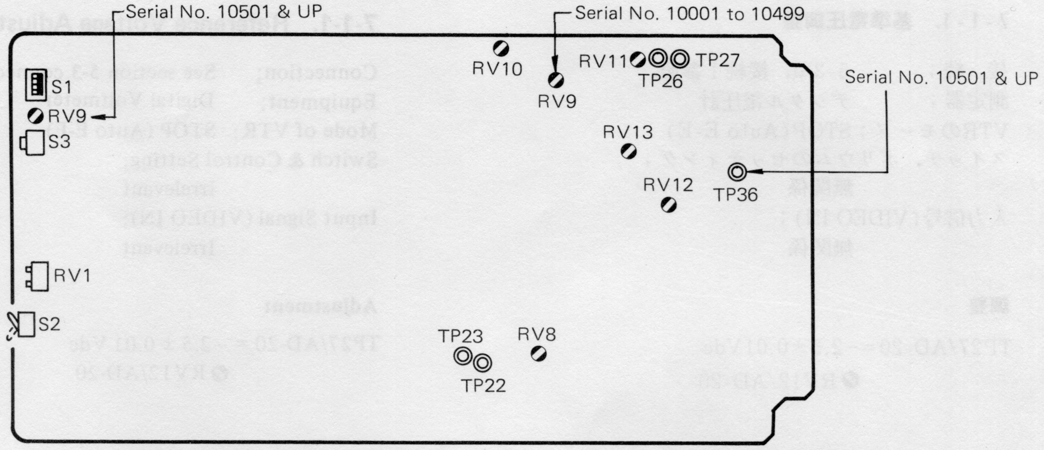
Step 4. **Window Phase Adjustment -2**



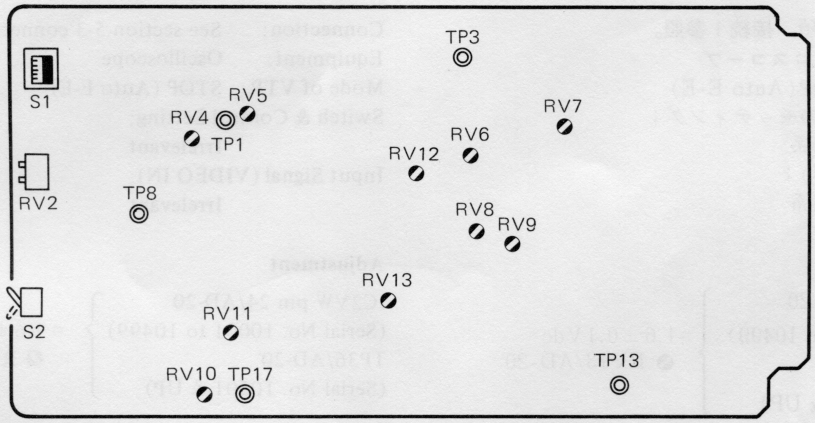
第7章
ビデオ信号系調整

SECTION 7
VIDEO SIGNAL SYSTEM ALIGNMENT

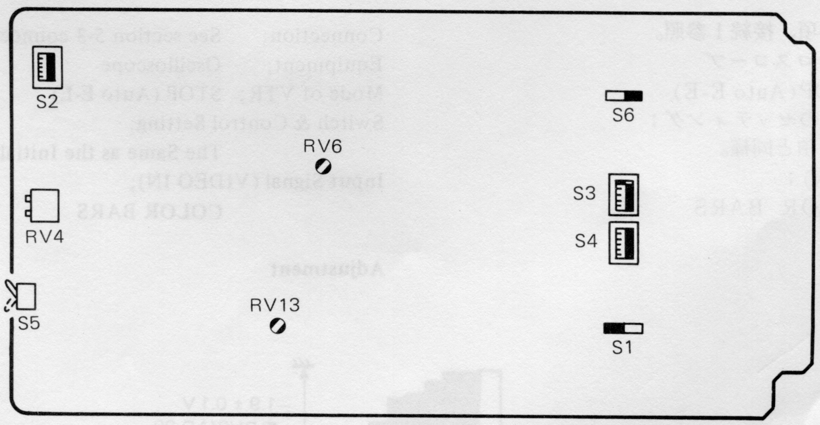
AD-20 Board



PR-64 Board



SG-10 Board



7-1. A/Dコンバーター調整

7-1-1. 基準電圧調整

接　続；　5-3項，接続1参照。
測定器；　デジタル電圧計
VTRのモード；STOP(Auto E-E)
スイッチ，ボリウムのセッティング；
　無関係
入力信号(VIDEO IN)；
　無関係

調整

TP27/AD-20＝−2.5±0.01Vdc
⊘RV12/AD-20

7-1-2. バイアス調整

接　続；　5-3項，接続1参照。
測定器；　オシロスコープ
VTRのモード；STOP(Auto E-E)
スイッチ，ボリウムのセッティング；
　無関係
入力信号(VIDEO IN)；
　無関係

調整

IC2VW pin 24/AD-20 (Serial No. 10001 to 10499)
TP36/AD-20 (Serial No. 10501 & UP)
} ＝1.6±0.1Vdc ⊘RV13/AD-20

7-1-3. ペデスタルレベル調整

接　続；　5-3項，接続1参照。
測定器；　オシロスコープ
VTRのモード；STOP(Auto E-E)
スイッチ，ボリウムのセッティング；
　5-5項と同様。
入力信号(VIDEO IN)；
　COLOR BARS

調整

7-1. A/D CONVERTER ALIGNMENT

7-1-1. Reference Voltage Adjustment

Connection; See section 5-3 connection 1.
Equipment; Digital Voltmeter
Mode of VTR; STOP (Auto E-E)
Switch & Control Setting;
Irrelevant
Input Signal (VIDEO IN);
Irrelevant

Adjustment

TP27/AD-20 = −2.5 ± 0.01 Vdc
⊘RV12/AD-20

7-1-2. Bias Adjustment

Connection; See section 5-3 connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto E-E)
Switch & Control Setting;
Irrelevant
Input Signal (VIDEO IN);
Irrelevant

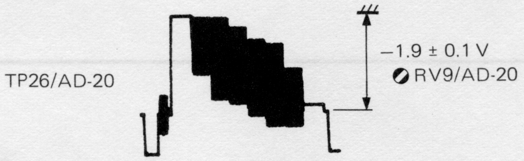
Adjustment

IC2VW pin 24/AD-20 (Serial No. 10001 to 10499)
TP36/AD-20 (Serial No. 10501 & UP)
} = 1.6 ± 0.1 Vdc ⊘RV13/AD-20

7-1-3. Pedestal Level Adjustment

Connection; See section 5-3 connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto E-E)
Switch & Control Setting;
The Same as the Initial Setting
Input Signal (VIDEO IN);
COLOR BARS

Adjustment



7-1-4. A/Dコンバーター入力レベル調整

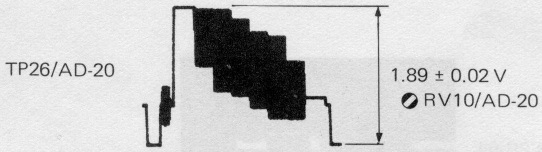
接　続；　　　5-3項，接続1参照。
測定器；　　　オシロスコープ
VTRのモード；STOP(Auto E-E)
スイッチ，ボリウムのセッティング；
　　　　　　　5-5項と同様。
入力信号(VIDEO IN)；
　　　　　　　COLOR　BARS

調整

7-1-4. A/D Converter Input Level Adjustment

Connection; See section 5-3 connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto E-E)
Switch & Control Setting;
The Same as the Initial Setting
Input Signal (VIDEO IN);
COLOR BARS

Adjustment



7-2. プロセッサー調整

7-2-1. ビデオレベルオフセット調整

接　続；　　　5-3項，接続1参照。
測定器；　　　オシロスコープ
VTRのモード；STOP(Auto E-E)
スイッチ，ボリウムのセッティング；
　　　　　　　5-5項と同様。
入力信号(VIDEO IN)；
　　　　　　　バースト付ビデオ信号

調整

ペデスタルレベルを基準レベルに一致させる。
　　　　　　　⊘RV 9/AD-20

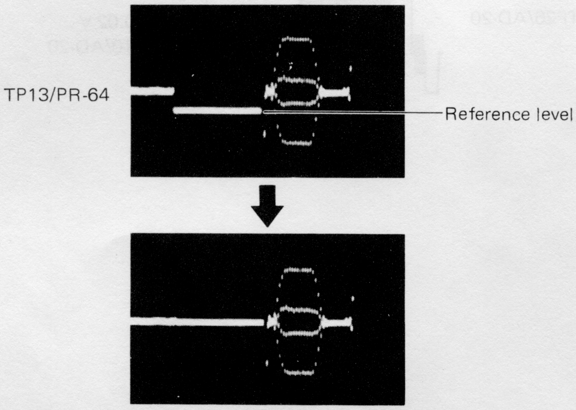
7-2. PROCESSOR ALIGNMENT

7-2-1. Video Level Offset Adjustment

Connection; See section 5-3 connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto E-E)
Switch & Control Setting;
The Same as the Initial Setting
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment

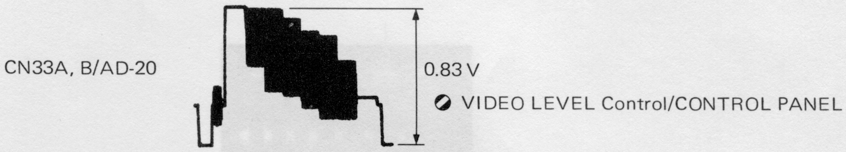
Equalize the pedestal level to the reference level.
⊘ RV9/AD-20



7-2-2. ビデオレベルプリセット調整

接　続；　　　5-3項，接続1参照。
測定器；　　　オシロスコープ
VTRのモード；STOP(Auto E-E)
スイッチ，ボリウムのセッティング；
　　　　　　　5-5項と同様。
入力信号(VIDEO IN)；
　　　　　　　COLOR BARS

Step1.　入力ビデオレベル校正



Step 2.　セットアップレベル校正
TP3/PR-64，セットアップレベル=0±10mVdc
　　⊘ SET UP LEVEL Control(RV2)/PR-64

Step 3.　ビデオレベルプリセット調整
TP3/PR-64，ビデオレベル=0.50±0.01Vp-p
　　⊘ RV7/PR-64

7-2-2. Video Level Preset Adjustment

Connection; See section 5-3 connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto E-E)
Switch & Control Setting;
The Same as the Initial Setting
Input Signal (VIDEO IN);
COLOR BARS

Step 1. Input Video Level Calibration

Step 2. Set up Level Calibration
TP3/PR-64, Set up level = 0 ± 10 mVdc
⊘ SET UP LEVEL Control (RV2)/PR-64

Step 3. Video Level Preset Adjustment
TP3/PR-64, Video level = 0.50 ± 0.01 Vp-p
⊘ RV7/PR-64

7-2-3. ビデオアンプ周波教特性調整

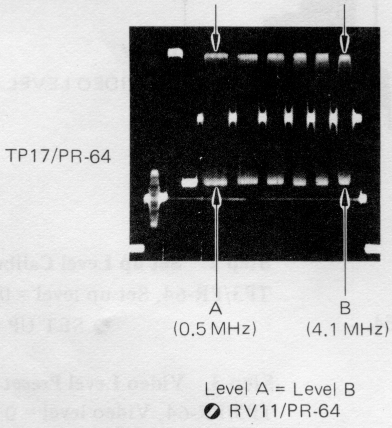
接　続；　5-3項，接続1参照。
測定器；　オシロスコープ
VTRのモード；STOP(Auto E-E)
スイッチ，ボリウムのセッティング；
　5-5項と同様。
入力信号(VIDEO IN)；
　MULTIBURST

調整

7-2-3. Video Amp. Frequency Response Adjustment

Connection; See section 5-3 connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto E-E)
Switch & Control Setting;
The Same as the Initial Setting
Input Signal (VIDEO IN);
MULTIBURST

Adjustment



注意；
調整後，7-2-5項の調整を必ずすること。

Note;
After this adjustment, the adjustment 7-2-5 should be performed.

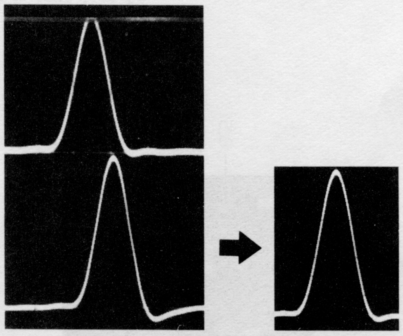
7-2-4. ディレーライン周波数特性調整

接　続；　　　5-3項，接続1参照。
測定器；　　　オシロスコープ
VTRのモード；STOP(Auto E-E)
スイッチ，ボリウムのセッティング；
　　　　　　　5-5項と同様。
入力信号(VIDEO IN)；
　　　　　　　PULSE & BAR (パルス幅=2T)

調整

TP17/PR-64

TP8/PR-64



TP8の波形がTP17の波形と同じになるように◑RV10/PR-64を調整する。

注意；
調整後，7-2-5項の調整を必ずすること。

7-2-4. Delay Line Frequency Response Adjustment

Connection; See section 5-3 connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto E-E)
Switch & Control Setting;
The Same as the Initial Setting
Input Signal (VIDEO IN);
PULSE & BAR (Pulse Width = 2T)

Adjustment

Adjust ◑RV10/PR-64 so that the waveform at TP8 is the same as one at TP17.

Note;
After this adjustment, the adjustment 7-2-5 should be performed.

7-2-5. クロマレベルプリセット調整

接　続；　　5-3項，接続1参照。
測定器；　　オシロスコープ
VTRのモード；STOP(Auto E-E)
スイッチ，ボリウムのセッティング；
　　　　　　5-5項と同様。
入力信号(VIDEO IN)；
　　　　　　MULTIBURST

調整

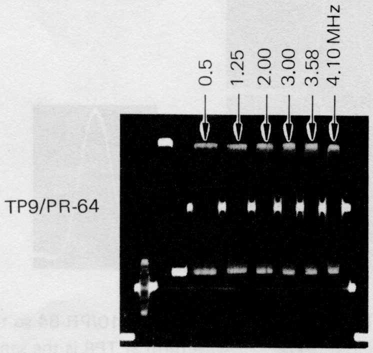
0.1〜4.1MHzの周波数特性がフラットになるように⊘RV13/PR-64を調整する。

7-2-5. Chroma Level Preset Adjustment

Connection; See section 5-3 connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto E-E)
Switch & Control Setting;
The Same as the Initial Setting
Input Signal (VIDEO IN);
MULTIBURST

Adjustment

Adjust ⊘ RV13/PR-64 so that the 0.1 to 4.1 MHz frequency response is flat.



7-2-6. セットアップレベルプリセット調整

接　続；　　5-3項，接続1参照。
測定器；　　オシロスコープ
VTRのモード；STOP(Auto E-E)
スイッチ，ボリウムのセッティング；
　　5-5項と同様。
入力信号(VIDEO IN)；
　　バースト付ビデオ信号

調整

TP-3/PR-64，セットアップレベル=0±2mVdc
　　RV9/PR-64

7-2-7. ダーククリップレベル調整

接　続；　　5-3項，接続1参照。
測定器；　　オシロスコープ
VTRのモード；STOP(Auto E-E)
スイッチ，ボリウムのセッティング；
　　5-5項と同様。
入力信号(VIDEO IN)；
　　バースト付ビデオ信号

調整

7-2-6. Set up Level Preset Adjustment

Connection; See section 5-3 connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto E-E)
Switch & Control Setting;
The Same as the Initial Setting
Input Signal (VIDEO IN);
Any Signal with Burst

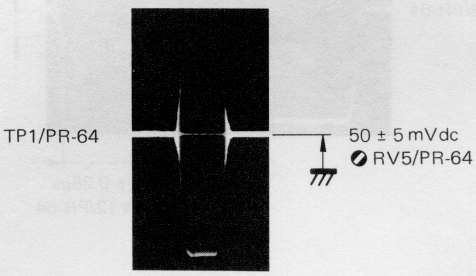
Adjustment

TP3/PR-64, Set up level = 0 ± 2 mVdc
RV9/PR-64

7-2-7. Dark Clip Level Adjustment

Connection; See section 5-3 connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto E-E)
Switch & Control Setting;
The Same as the Initial Setting
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment



7-2-8. バースト信号位置/幅調整

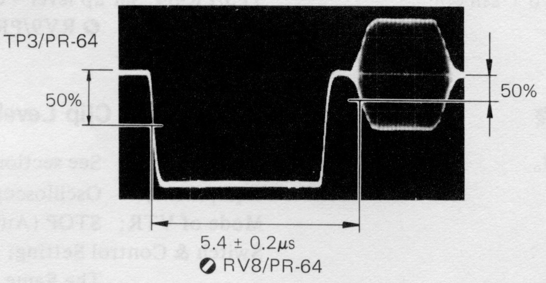
接　続；　5-3項，接続1参照。
測定器；　オシロスコープ
VTRのモード；STOP(Auto E-E)
スイッチ，ボリウムのセッティング；
　5-5項と同様。
入力信号(VIDEO IN)；
　バースト付ビデオ信号

7-2-8. Burst Position and Width Adjustment

Connection; See section 5-3 connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto E-E)
Switch & Control Setting;
　The Same as the Initial Setting
Input Signal (VIDEO IN);
　Any Signal with Burst

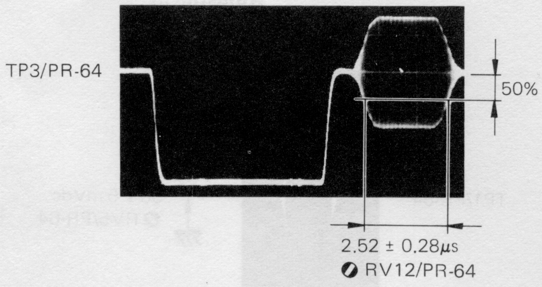
Step1. 位置調整

Step 1. Burst Position Adjustment



Step2. 幅調整

Step 2. Burst Width Adjustment



7-2-9. バースト信号レベル調整

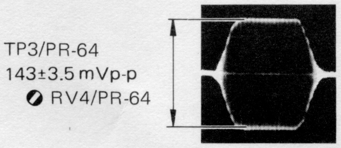
接　続；　5-3項，接続1参照。
測定器；　オシロスコープ
VTRのモード；STOP(Auto E-E)
スイッチ，ボリウムのセッティング；
　5-5項と同様。
入力信号(VIDEO IN)；
　バースト付ビデオ信号

7-2-9. Burst Level Adjustment

Connection; See section 5-3 connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto E-E)
Switch & Control Setting;
　The Same as the Initial Setting
Input Signal (VIDEO IN);
　Any Signal with Burst

調整

Adjustment



7-2-10. SYNCレベル調整

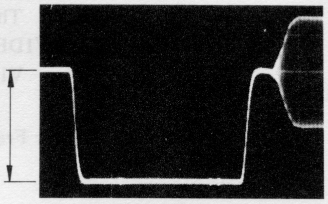
接　続；　　　5-3項，接続1参照。
測定器；　　　オシロスコープ
VTRのモード；STOP(Auto E-E)
スイッチ，ボリウムのセッティング；
　　　　　　　5-5項と同様。
入力信号(VIDEO IN)；
　　　　　　　バースト付ビデオ信号

調整

7-2-10. Sync Level Adjustment

Connection; See section 5-3 connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto E-E)
Switch & Control Setting;
The Same as the Initial Setting
Input Signal (VIDEO IN);
Any Signal with Burst

Adjustment



7-2-11. A/Dコンバーターバランス調整

接　続；　　　5-3項，接続1参照。
測定器；　　　オシロスコープ
VTRのモード；STOP(Auto E-E)
スイッチ，ボリウムのセッティング；
　　　　　　　5-5項と同様。
入力信号(VIDEO IN)；
　　　　　　　RAMP LINEARITY

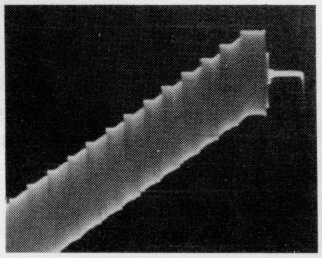
調整
量子化エラー：最少
RV11/AD-20

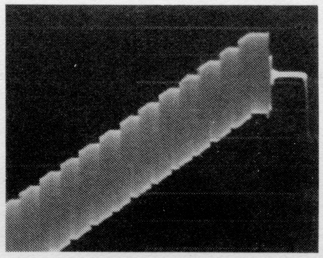
7-2-11. A/D Converter Balance Adjustment

Connection; See section 5-3 connection 1.
Equipment; Oscilloscope
Mode of VTR; STOP (Auto E-E)
Switch & Control Setting;
The Same as the Initial Setting
Input Signal (VIDEO IN);
RAMP LINEARITY

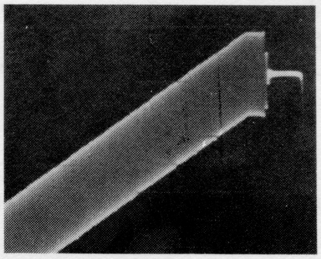
Adjustment
Quantizing Error; Minimum
RV11/AD-20

INCORRECT





CORRECT



7-2-12. HUEプリセット調整

注意；
この調整をする前に，BVH-2000/2180の次の調整をすること。

13- 9項；バーストレベル/位相調整
13-25項；バースト位相/レベル調整

接　続；　5-3項，接続1参照。
測定器；　ベクトルスコープ
VTRのモード；STOP(Auto E-E)
スイッチ，ボリウムのセッティング；
　5-5項と同様。
入力信号(VIDEO IN)；
　VIDEO SWEEP, COLOR BARS

Step 1. 中心周波数同調

Step 2. HUEコントロール電圧設定
HUE REMOTE/LOCAL sw(S2-5, 6)/SG-10；LOCAL
IC9pin 1/SG-10=0±0.01Vdc
⊘RV4/SG-10

Step 3. HUEプリセット調整
ベクトルスコープ上のバースト-クロマ位相を正規に調整する。　⊘RV6/SG-10

Step 4. デューティ調整
TP2/SG-10=6±1Vdc
⊘RV13/SG-10

Step 5. DT再生HUEプリセット調整
VTRのモード；DT VAR 1 (COLOR BAR信号)
ベクトルスコープ上のバースト-クロマ位相を正規に調整する。　⊘LV3/AD-20

Step 6.
HUE REMOTE/LOCAL sw (S2-5, 6)/SG-10；REMOTE

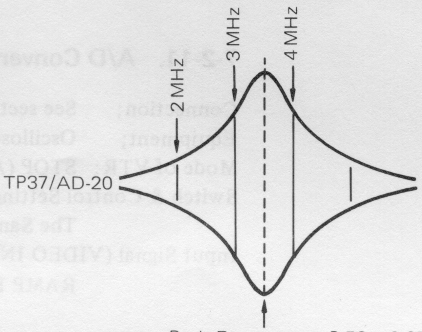
7-2-12. HUE Preset Adjustment

Note;
Prior to performing this adjustment, make the following adjustments of the BVH-2000/2180.

Sec. 13-9; Burst Level and Phase Adjustment
Sec. 13-25; Burst Phase and Level Adjustment

Connection; See section 5-3 connection 1.
Equipment; Vectorscope
Mode of VTR; STOP (Auto E-E)
Switch & Control Setting;
The Same as the Initial Setting
Input Signal (VIDEO IN);
VIDEO SWEEP, COLOR BARS

Step 1. Center Frequency Tuning



Peak Frequency = 3.50 ± 0.05 MHz
⊘LV2/AD-20

Step 2. HUE Control Voltage Setting
HUE REMOTE/LOCAL sw (S2-5,6)/SG-10; LOCAL
IC9 pin 1/SG-10 = 0 ± 0.01 Vdc
⊘RV4/SG-10

Step 3. HUE Preset Adjustment
Normalize the burst-chroma phase on the vectorscope.
⊘RV6/SG-10

Step 4. DUTY Adjustment
TP2/SG-10 = 6 ± 1 Vdc
⊘RV13/SG-10

Step 5. DT PLAY HUE Preset Adjustment
Mode of VTR; DT VAR1 (COLOR BAR Signal)
Normalize the burst-chroma phase on the vectorscope.
⊘LV3/AD-20

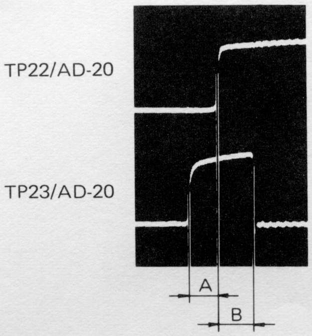
Step 6.
HUE REMOTE/LOCAL sw (S2-5,6)/SG-10; REMOTE

7-2-13. PB CF WINDOW調整

接　続；　　　5-3項，接続1参照。
測定器；　　　オシロスコープ
VTRのモード；PB(アライメントテープ使用)
スイッチ，ボリウムのセッティング；
　　　　　　　5-5項と同様。
入力信号(VIDEO IN)；
　　　　　　　バースト付ビデオ信号

Step 1.
PB CF NORM/ADJ sw (S2)/AD-20；ADJ
PB CF REMOTE/LOCAL sw (S1-3, 4)/AD-20；
　　LOCAL

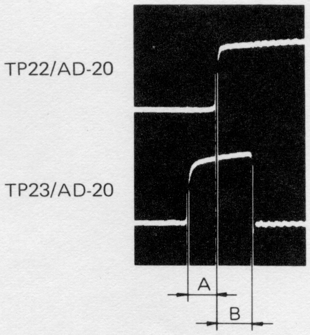
Step 2. WINDOW位相調整-1



$\frac{B}{A} = 1.0 \pm 0.1$
⊘PB CF CONT (RV1)/AD-20

Step 3.
PB CF NORM/ADJ sw (S2)/AD-20；NORM

Step 4. WINDOW位相調整-2



A = B ± 10 ns
⊘RV8/AD-20

Step 5.
PB CF REMOTE/LOCAL sw (S1-3, 4)/AD-20；
　　REMOTE

7-2-13. PB CF Window Adjustment

Connection; See section 5-3 connection 1.
Equipment; Oscilloscope
Mode of VTR; PB (Use Alignment Tape)
Switch & Control Setting;
　The Same as the Initial Setting
Input Signal (VIDEO IN);
　Any Signal with Burst

Step 1.
PB CF NORM/ADJ sw (S2)/AD-20; ADJ
PB CF REMOTE/LOCAL sw (S1-3,4)/AD-20; LOCAL

Step 2. Window Phase Adjustment -1

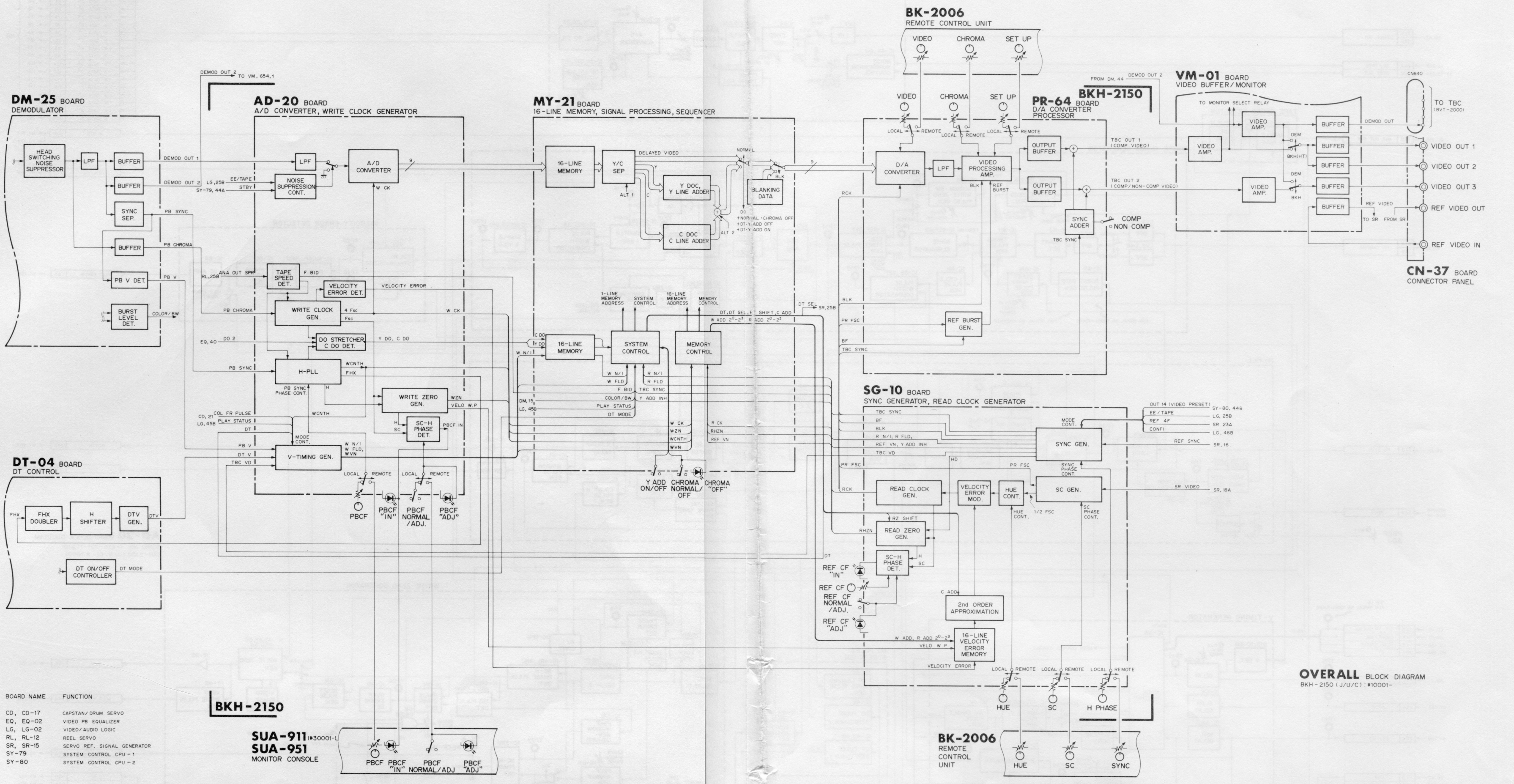
Step 3.
PB CF NORM/ADJ sw (S2)/AD-20; NORM

Step 4. Window Phase Adjustment -2

Step 5.
PB CF REMOTE/LOCAL sw (S1-3,4)/AD-20; REMOTE

SECTION A
BLOCK DIAGRAMS

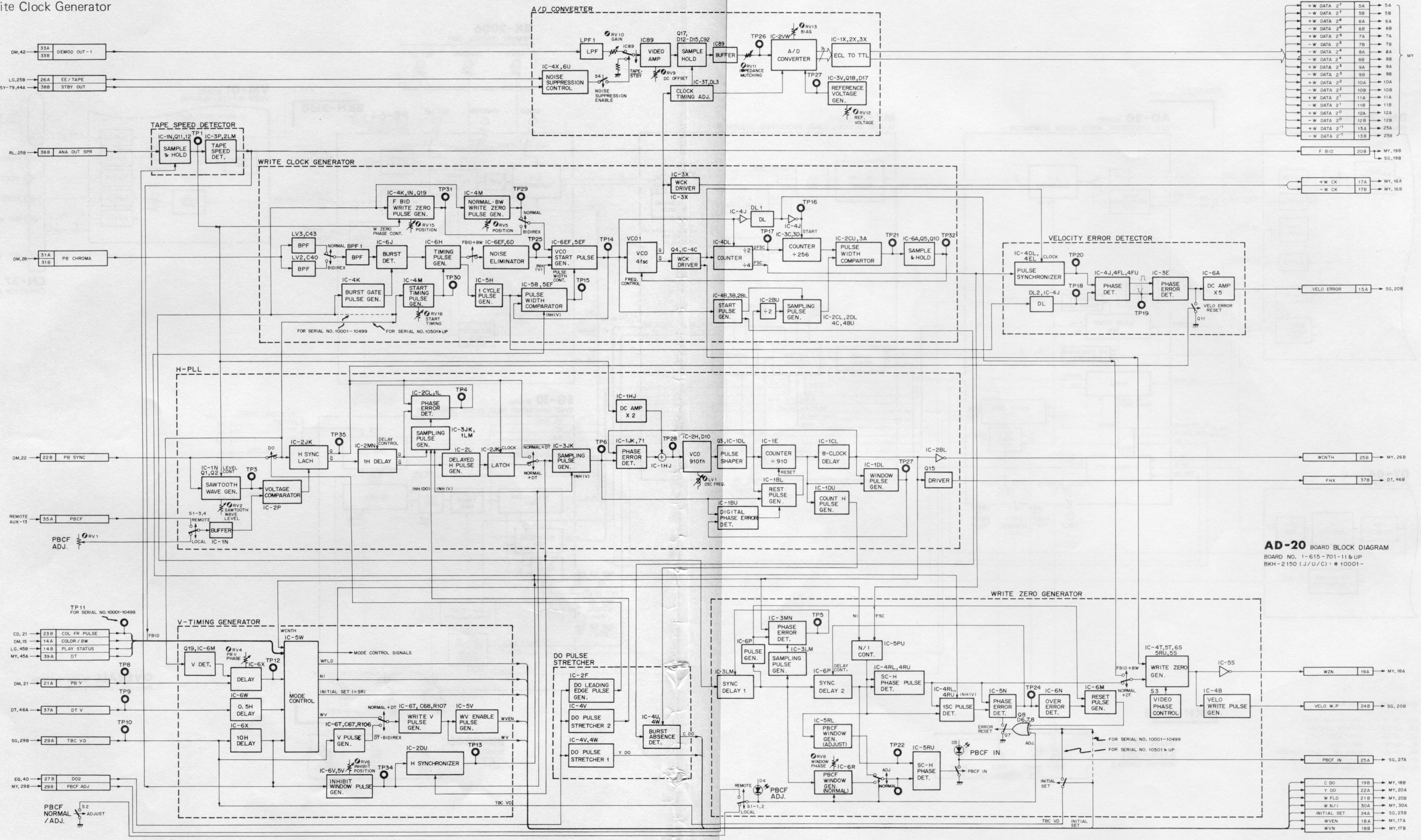
OVERALL BLOCK DIAGRAM



BOARD NAME	FUNCTION
CD, CD-17	CAPSTAN/DRUM SERVO
EQ, EQ-02	VIDEO PB EQUALIZER
LG, LG-02	VIDEO/AUDIO LOGIC
RL, RL-12	REEL SERVO
SR, SR-15	SERVO REF. SIGNAL GENERATOR
SY-79	SYSTEM CONTROL CPU-1
SY-80	SYSTEM CONTROL CPU-2

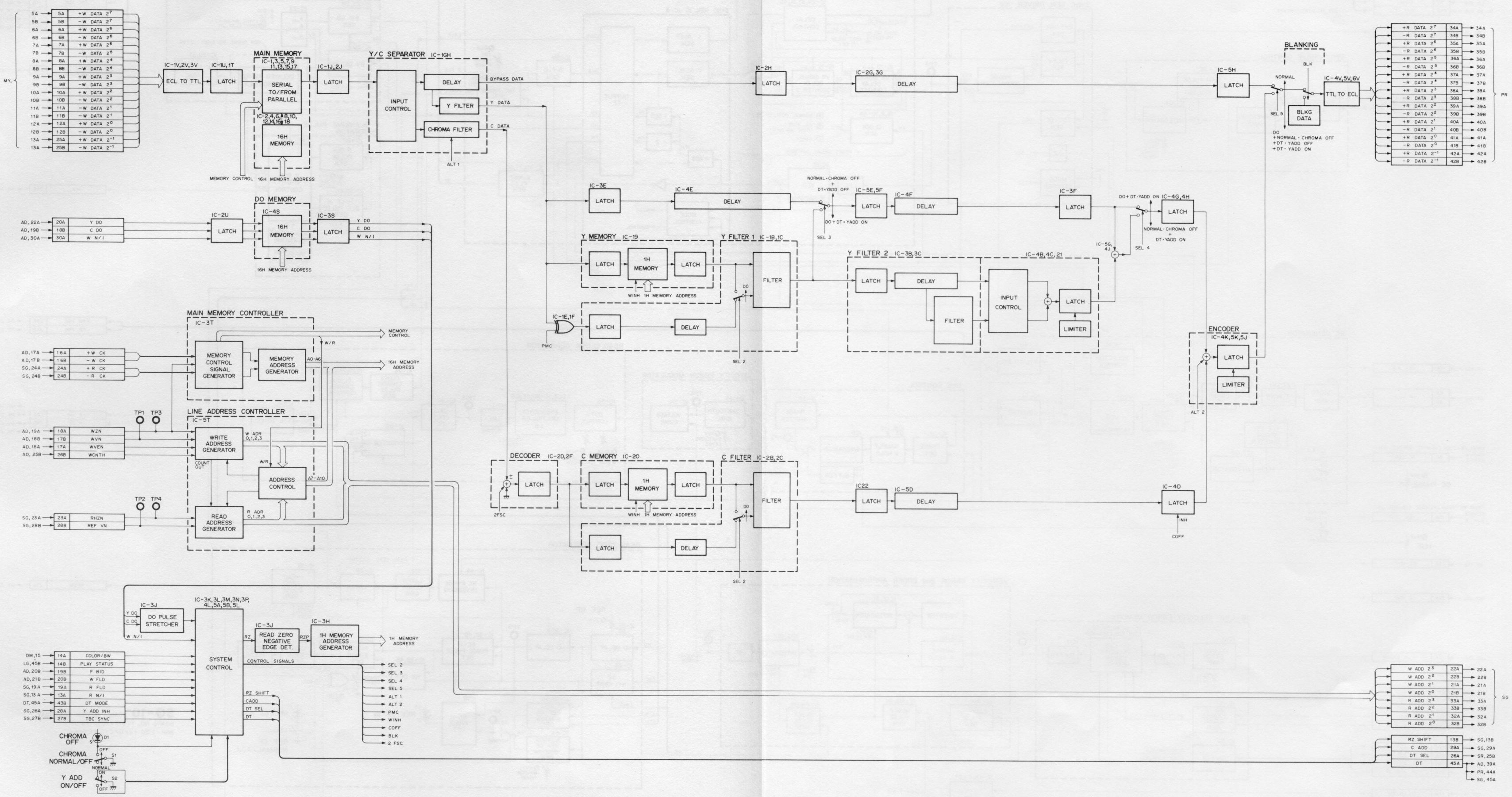
OVERALL BLOCK DIAGRAM
BKH-2150 (J/U/C) : *10001-

AD-20 BOARD
A/D Converter
Write Clock Generator



MY-21 BOARD

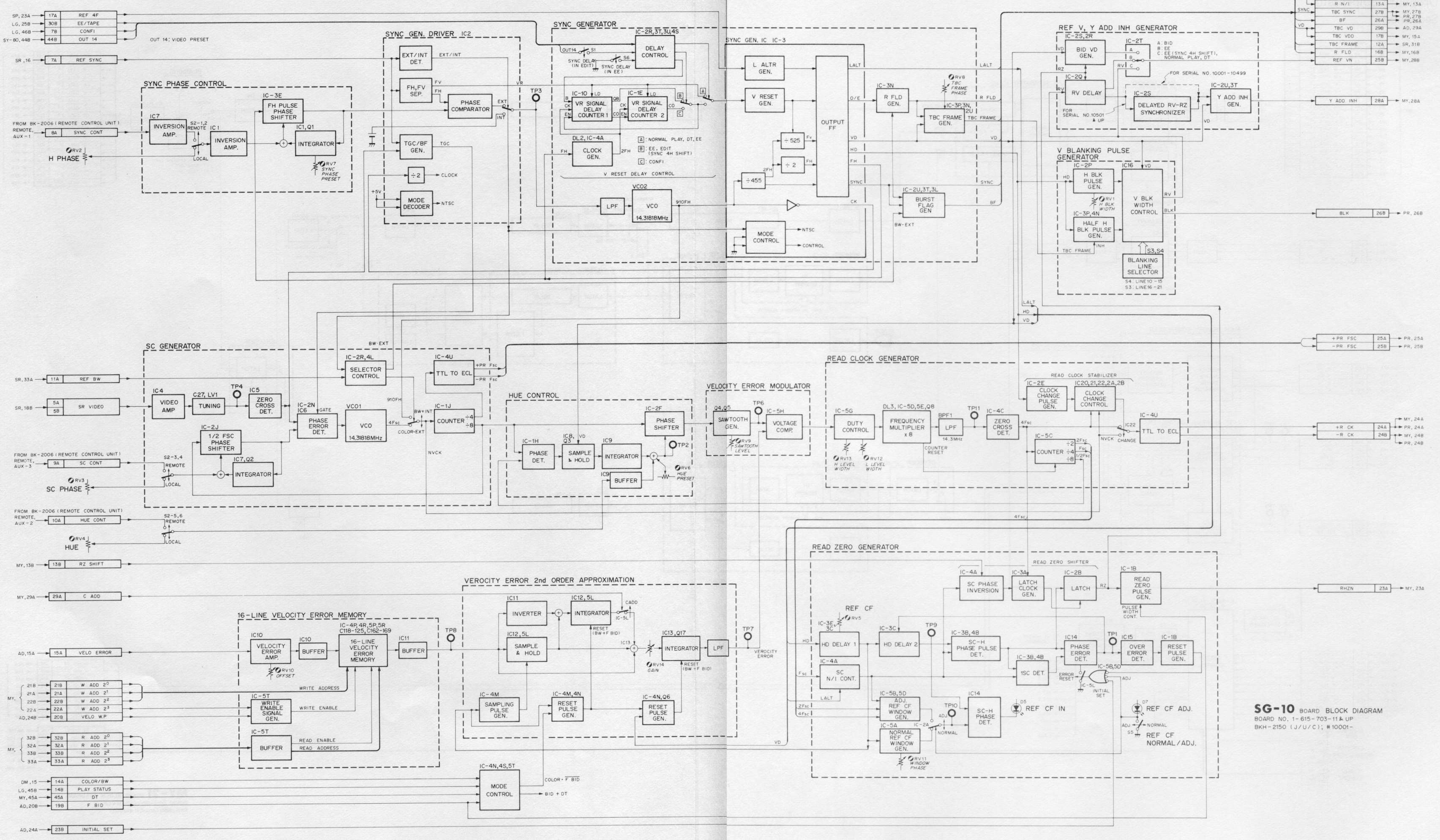
16-Line Memory
Dropout Compensator
Sequencer



MY-21 BOARD BLOCK DIAGRAM
BOARD NO. 1-615-702-11 & UP
BKH-2150 (J/U/C): #10001-

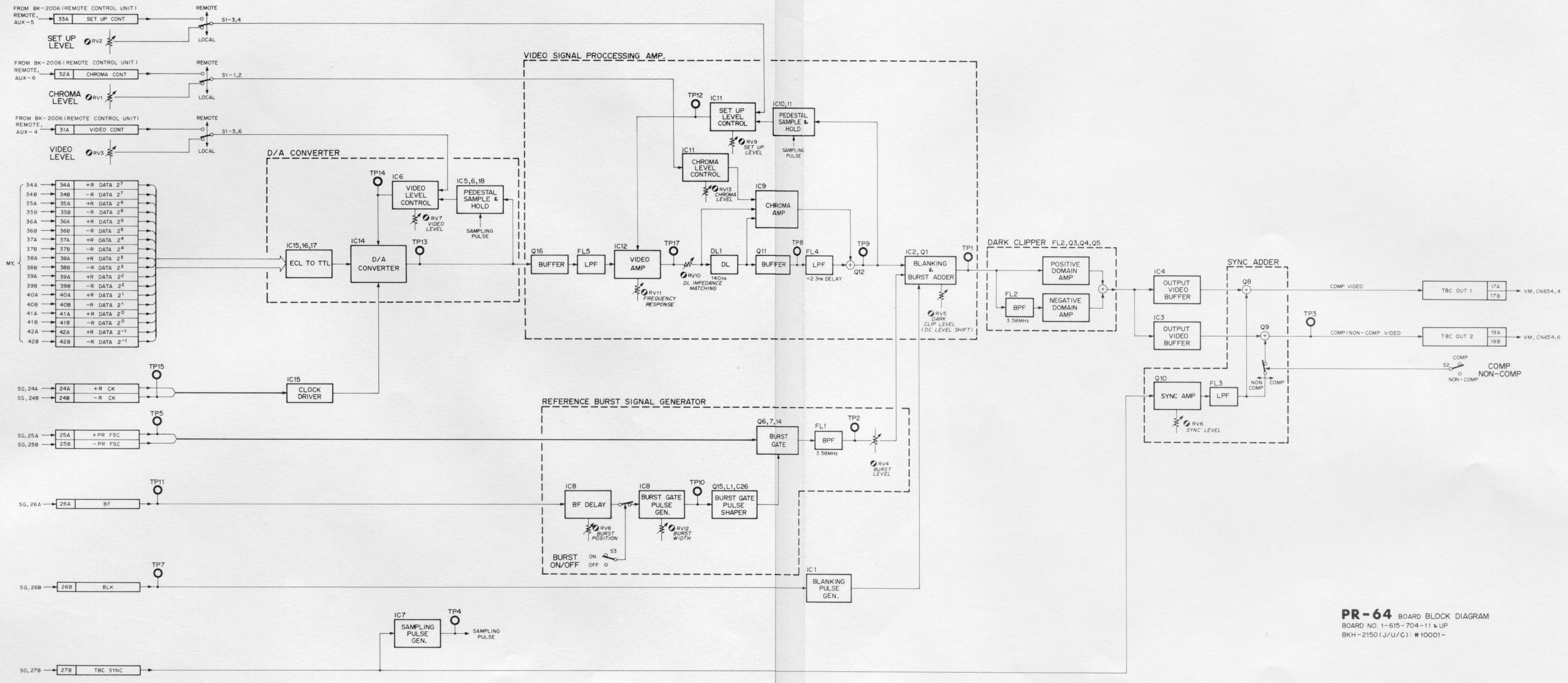
SG-10 BOARD

Sync Generator
Read Clock Generator



SG-10 BOARD BLOCK DIAGRAM
BOARD NO. 1-615-703-11 & UP
BKH-2150 (J/U/C); #10001-

PR-64 BOARD
D/A Converter
Processor



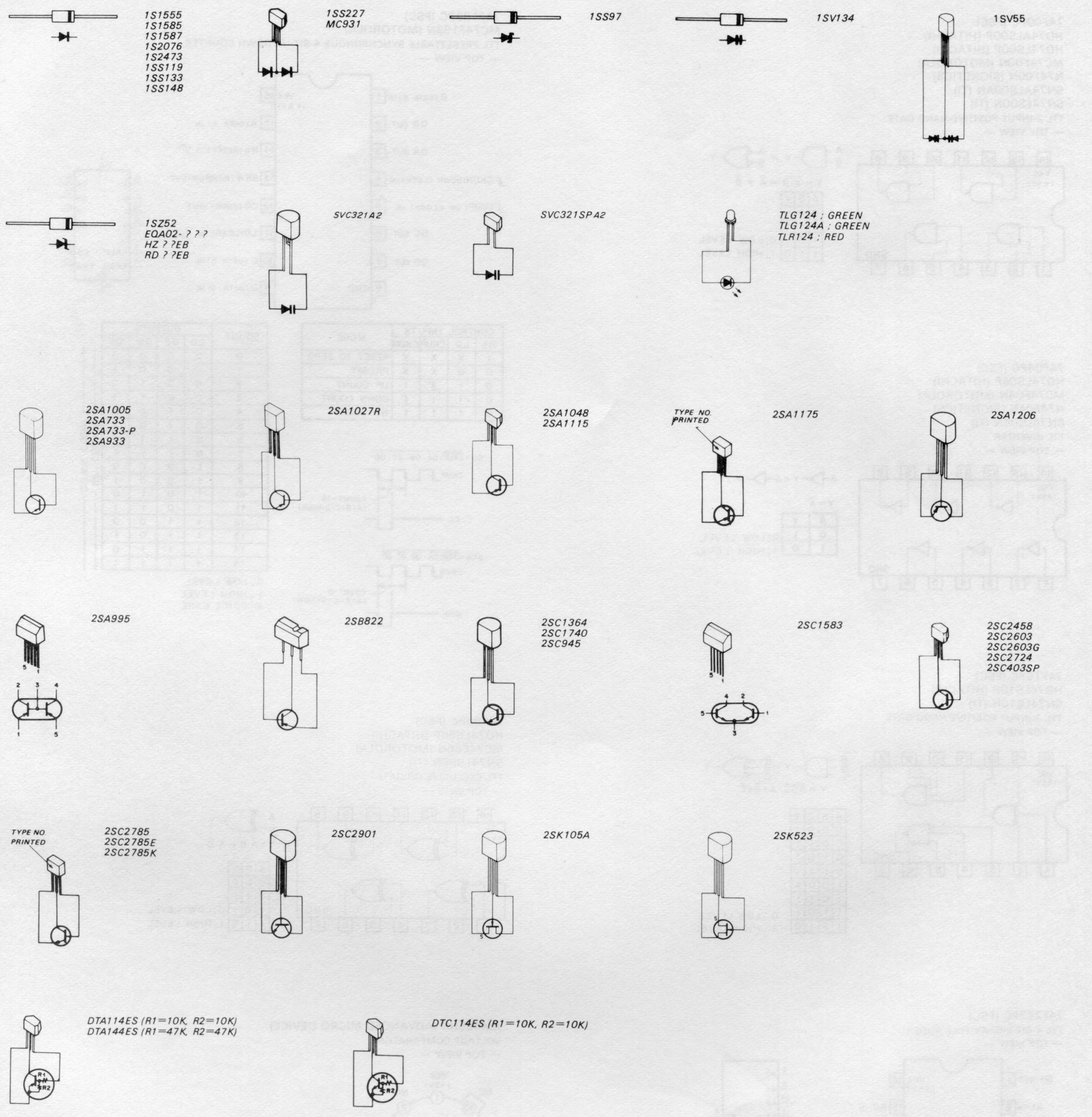
PR-64 BOARD BLOCK DIAGRAM
BOARD NO. 1-615-704-11 & UP
BKH-2150(J/U/C): #10001-

SECTION B
SEMICONDUCTOR PIN ASSIGNMENTS

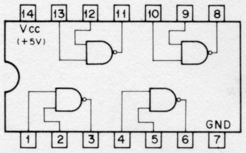
The circuit diagram of each IC is obtained from the IC data book published by the manufacturer.

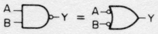
TYPE	PAGE
1S1555	B-3
1S1585	B-3
1S1587	B-3
1S2076	B-3
1S2473	B-3
1SS119	B-3
1SS133	B-3
1SS148	B-3
1SS227	B-3
1SS97-1	B-3
1SV134	B-3
1SV55	B-3
1SZ52	B-3
2SA1005	B-3
2SA1027R	B-3
2SA1048	B-3
2SA1048GR	B-3
2SA1115	B-3
2SA1175	B-3
2SA1206	B-3
2SA733	B-3
2SA733P	B-3
2SA933S-Q	B-3
2SA933S-R	B-3
2SA933S-S	B-3
2SA995	B-3
2SB822	B-3
2SC1364	B-3
2SC1583	B-3
2SC1740	B-3
2SC2458	B-3
2SC2603	B-3
2SC2603G	B-3
2SC2724	B-3
2SC2724-C	B-3
2SC2785	B-3
2SC2785-E	B-3
2SC2785-K	B-3
2SC2901	B-3
2SC403SP	B-3
2SC945	B-3
2SK105A-20	B-3
2SK105A-30	B-3
2SK523-L2	B-3
2SK523-M1	B-3
74F00PC	B-4
74F04PC	B-4
74F10PC	B-4
74F193PC	B-4
74F283PC	B-4
74F86PC	B-4
AM686HC	B-4
BX1288	B-5
BX1289	B-5
BX1341	B-5
BX1355	B-6
BX365A	B-6
BX366A	B-6
BX381	B-6
BX3931A	B-6
CA3080E	B-6
CA3102E	B-6
CX20051A	B-7
CX20060	B-6
CX20158	B-6
CX20160	B-7
CX20161	B-7
CX20162	B-7
CX20163	B-8
CX20164	B-8
CX20165	B-9
CX20167	B-9
CX20194	B-9
CX20195	B-10
CX20196	B-10
CX20219	B-11
CX20220-1DOT	B-11
CX23024	B-11
CX23038	B-12
CX23065	B-12
CX23082	B-13
CX7930A	B-14
CX7998	B-15
CXA1016D	B-16
DTA114ES	B-3
DTA144ES	B-3
DTC114ES	B-3
EQA02-08A	B-3
HD10101	B-16
HD10102	B-16
HD10105	B-16
HD10116	B-16
HD10124	B-16
HD10125	B-16
HD74ALS00P	B-4
HD74HC00P	B-17
HD74HC04P	B-17
HD74HC08P	B-17
HD74HC10P	B-17
HD74HC11P	B-17
HD74HC123P	B-17
HD74HC153P	B-17
HD74HC157P	B-18
HD74HC163P	B-18
HD74HC164P	B-18
HD74HC174P	B-18
HD74HC175P	B-18
HD74HC21P	B-19
HD74HC240P	B-19
HD74HC253P	B-19
HD74HC32P	B-19
HD74HC4040P	B-19
HD74HC4538P	B-20
HD74HC74P	B-20
HD74HC86P	B-20
HD74HCT240P	B-19
HD74LS00P	B-4
HD74LS02P	B-20
HD74LS04P	B-4
HD74LS08P	B-20
HD74LS10P	B-4
HD74LS123P	B-21
HD74LS153P	B-21
HD74LS157P	B-21
HD74LS221P	B-21
HD74LS32P	B-21
HD74LS74AP	B-22
HD74LS86P	B-4
HI1-0201-5	B-22
HM6168HP-45	B-22
HN27C64G-20	B-29
HZ5.1EB1	B-3
HZ5.1EB2	B-3
HZ5.1EB3	B-3
HZ6.8EB1	B-3
HZ6.8EB2	B-3
HZ6.8EB3	B-3
HZ7.5EB1	B-3
HZ7.5EB2	B-3
HZ7.5EB3	B-3
MB4002	B-22
MB7112E	B-29
MB7134H	B-29
MBM27C64-25	B-29
MC10101L	B-16
MC10102L	B-16
MC10105L	B-16
MC10115L	B-22
MC10116L	B-16
MC10124L	B-16
MC10125L	B-16
MC1496M	B-22
MC1496P	B-22
MC1595L	B-22
MC1596G	B-22
MC1648P	B-23
MC74F00N	B-4
MC74F04N	B-4
MC74F193N	B-4
MC74F74N	B-22

TYPE	PAGE
MC74F86N	B-4
MC74HC00N	B-17
MC74HC04N	B-17
MC74HC08N	B-17
MC74HC10N	B-17
MC74HC11N	B-17
MC74HC153N	B-17
MC74HC157N	B-18
MC74HC163N	B-18
MC74HC164N	B-18
MC74HC174N	B-18
MC74HC175N	B-18
MC74HC21N	B-19
MC74HC240N	B-19
MC74HC253N	B-19
MC74HC32N	B-19
MC74HC4040N	B-19
MC74HC4538N	B-20
MC74HC688N	B-23
MC74HC74N	B-20
MC74HC86N	B-20
MC74HCT240N	B-19
MC931	B-3
N74F00N	B-4
N74F04N	B-4
N74F86N	B-4
NE527N	B-23
NJM1496M	B-22
NJM2903D	B-23
NJM555D	B-23
RD6.8EB	B-3
RD7.5E	B-3
SN74ALS00AN	B-4
SN74ALS574N	B-24
SN74LS00N	B-4
SN74LS02N	B-20
SN74LS04N	B-4
SN74LS08N	B-20
SN74LS10N	B-4
SN74LS123N	B-21
SN74LS153N	B-21
SN74LS157N	B-21
SN74LS161AN	B-24
SN74LS163AN	B-24
SN74LS164N	B-24
SN74LS174N	B-25
SN74LS175N	B-25
SN74LS20N	B-25
SN74LS221N	B-21
SN74LS240N	B-25
SN74LS266N	B-25
SN74LS283N	B-25
SN74LS32N	B-21
SN74LS33N	B-25
SN74LS399N	B-26
SN74LS688N	B-26
SN74LS74AN	B-22
SN74LS86N	B-4
SN75207BN	B-26
SVC321-A2	B-3
SVC321SP-A2	B-3
TC74HC00F	B-17
TC74HC00P	B-17
TC74HC02F	B-26
TC74HC04F	B-17
TC74HC04P	B-17
TC74HC08F	B-17
TC74HC08P	B-17
TC74HC10F	B-17
TC74HC10P	B-17
TC74HC11P	B-17
TC74HC123P	B-17
TC74HC153F	B-17
TC74HC153P	B-17
TC74HC157P	B-18
TC74HC161F	B-26
TC74HC163P	B-18
TC74HC164P	B-18
TC74HC174P	B-18
TC74HC175F	B-18
TC74HC175P	B-18
TC74HC21P	B-19
TC74HC240P	B-19
TC74HC244P	B-26
TC74HC253P	B-19
TC74HC283P	B-27
TC74HC32P	B-19
TC74HC4040P	B-19
TC74HC4538P	B-20
TC74HC574F	B-27
TC74HC688P	B-23
TC74HC74F	B-20
TC74HC74P	B-20
TC74HC86F	B-20
TC74HC86P	B-20
TC74HCT240P	B-19
TC74HCT244P	B-26
TC74HCT574P	B-27
TL082CP	B-27
TL084CN	B-27
TL592P	B-27
TL607CP	B-27
TLG124A	B-3
TLR124	B-3
TMM2015AP-90	B-27
uA733CN	B-28
uA796PC	B-22
uPA54H	B-28
uPA64H	B-28
uPC1037H	B-28
uPC319C	B-28
uPC358C	B-28
uPC393C	B-23
uPC4082C	B-27
uPC4557C	B-28
uPD4051BC	B-28


1S1555
1S1585
1S1587
1S2076
1S2473
1SS119
1SS133
1SS148
1SS227
MC931
1SS97
1SV134
1SV55
1SZ52
EQA02- ? ? ?
HZ ? ?EB
RD ? ?EB
SVC321A2
SVC321SPA2
TLG124 ; GREEN
TLG124A ; GREEN
TLR124 ; RED
2SA1005
2SA733
2SA733-P
2SA933
2SA1027R
2SA1048
2SA1115
TYPE NO. PRINTED
2SA1175
2SA1206
2SA995
2SB822
2SC1364
2SC1740
2SC945
2SC1583
2SC2458
2SC2603
2SC2603G
2SC2724
2SC403SP
TYPE NO PRINTED
2SC2785
2SC2785E
2SC2785K
2SC2901
2SK105A
2SK523
DTA114ES (R1=10K, R2=10K)
DTA144ES (R1=47K, R2=47K)
DTC114ES (R1=10K, R2=10K)

74F00PC (FSC)
HD74ALS00P (HITACHI)
HD74LS00P (HITACHI)
MC74F00N (MOTOROLA)
N74F00N (SIGNETICS)
SN74ALS00AN (TI)
SN74LS00N (TI)
TTL 2-INPUT POSITIVE-NAND GATE
— TOP VIEW —



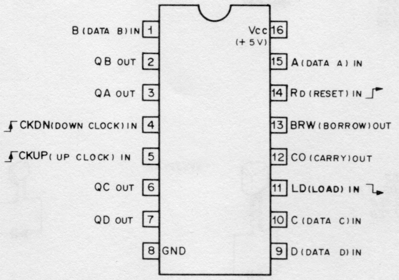


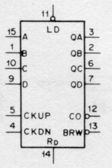
$Y = \overline{A \cdot B} = \overline{A} + \overline{B}$

A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

0; LOW LEVEL
1; HIGH LEVEL

74F193PC (FSC)
MC74F193N (MOTOROLA)
TTL PRESETTABLE SYNCHRONOUS 4-BIT UP/DOWN COUNTER
— TOP VIEW —



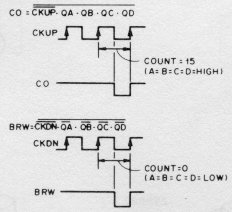


CONTROL INPUTS				MODE
RD	LD	CKUP	CKDN	
1	X	X	X	RESET TO ZERO
0	0	X	X	PRESET
0	1	⨍	1	UP COUNT
0	1	1	⨍	DOWN COUNT
0	1	1	1	NO COUNT

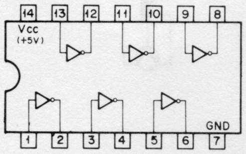
COUNT	OUTPUTS			
	QD	QC	QB	QA
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1
10	1	0	1	0
11	1	0	1	1
12	1	1	0	0
13	1	1	0	1
14	1	1	1	0
15	1	1	1	1

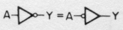
UP COUNT ↑ / DOWN COUNT ↓

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE



74F04PC (FSC)
HD74LS04P (HITACHI)
MC74F04N (MOTOROLA)
N74F04N (SIGNETICS)
SN74LS04N (TI)
TTL INVERTER
— TOP VIEW —



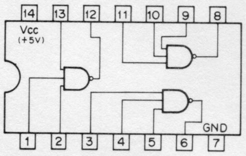


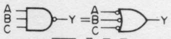
$Y = \overline{A}$

A	Y
0	1
1	0

0; LOW LEVEL
1; HIGH LEVEL

74F10PC (FSC)
HD74LS10P (HITACHI)
SN74LS10N (TI)
TTL 3-INPUT POSITIVE NAND GATE
— TOP VIEW —



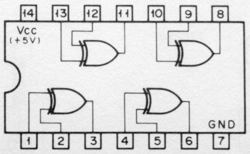


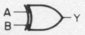
$Y = \overline{ABC} = \overline{A} + \overline{B} + \overline{C}$

A	B	C	Y
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	0

0 : LOW LEVEL
1 : HIGH LEVEL

74F86PC (FSC)
HD74LS86P (HITACHI)
MC74F86N (MOTOROLA)
SN74LS86N (TI)
TTL EXCLUSIVE OR GATE
— TOP VIEW —



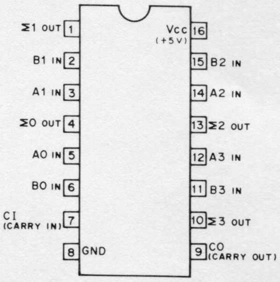


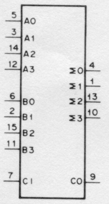
$Y = \overline{A} \cdot B + A \cdot \overline{B}$

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	0

0; LOW LEVEL
1; HIGH LEVEL

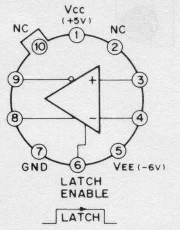
74F283PC (FSC)
TTL 4-BIT BINARY FULL ADDER
— TOP VIEW —





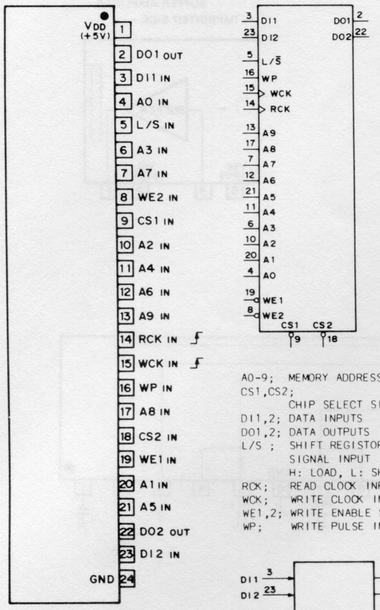
	2^4	2^3	2^2	2^1	2^0	DIGIT
					CI	CARRY IN
		A3	A2	A1	A0	DATA A IN
+)		B3	B2	B1	B0	DATA B IN
	CO	Σ3	Σ2	Σ1	Σ0	CARRY & SUM OUT
EX.					1	CI
		1	0	1	1	A
+)		1	0	1	0	B
	1	0	1	1	0	OUTPUTS
	CO	Σ3	Σ2	Σ1	Σ0	

AM686HC (ADVANCED MICRO DEVICE)
VOLTAGE COMPARATOR
— TOP VIEW —

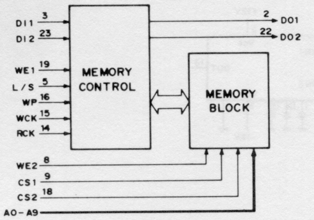


BX1288 (SONY)

C-MOS LINE MEMORY (16-LINEx2-BIT) WITH TTL INPUTS/OUTPUTS
— SIDE VIEW —

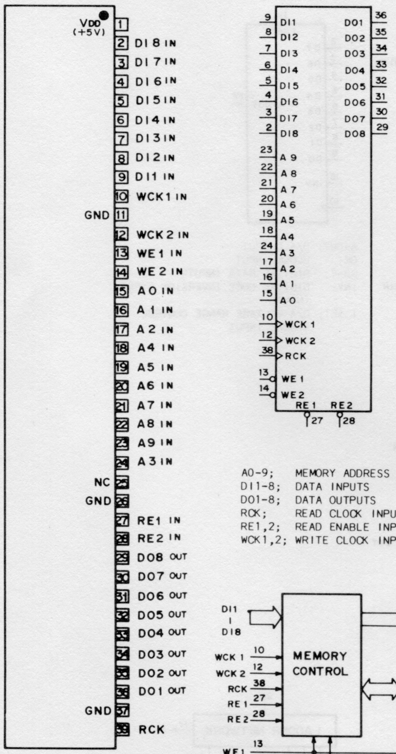


A0–9; MEMORY ADDRESS INPUTS
CS1,CS2; CHIP SELECT SIGNAL INPUTS
DI1,2; DATA INPUTS
DO1,2; DATA OUTPUTS
L/S ; SHIFT REGISTOR LOAD/SHIFT SIGNAL INPUT
H: LOAD, L: SHIFT
RCK; READ CLOCK INPUT
WCK; WRITE CLOCK INPUT
WE1,2; WRITE ENABLE SIGNAL INPUT
WP; WRITE PULSE INPUT

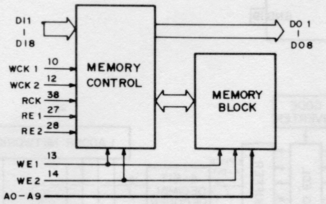


BX1289 (SONY)

C-MOS LINE MEMORY (1-LINEx8-BIT) WITH TTL INPUTS/OUTPUTS
— SIDE VIEW —

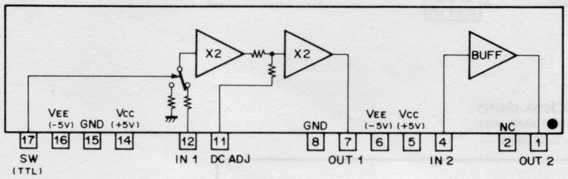


A0–9; MEMORY ADDRESS INPUTS
DI1–8; DATA INPUTS
DO1–8; DATA OUTPUTS
RCK; READ CLOCK INPUT
RE1,2; READ ENABLE INPUTS
WCK1,2; WRITE CLOCK INPUTS



BX1341 (SONY)

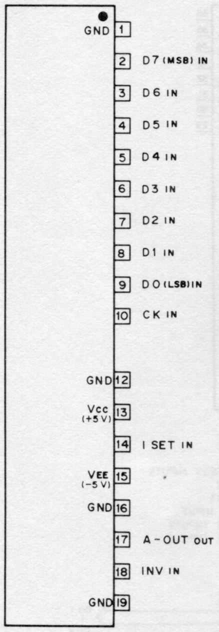
VIDEO AMPLIFIERS AND BUFFER FOR SAMPLE/HOLD PROCESSING
— SIDE VIEW —

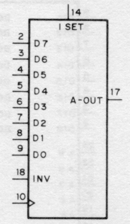


SW	VIDEO AMP IN
0	GND
1	IN 1

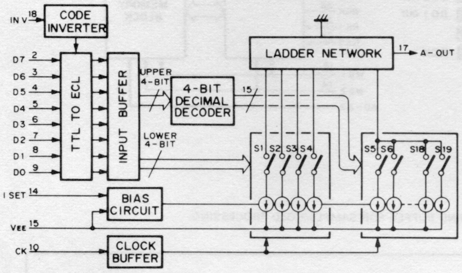
0; LOW LEVEL
1; HIGH LEVEL

BX1355 (SONY)
8-BIT D/A CONVERTER WITH INPUT DATA CODE INVERTER (TTL INPUT)
— SIDE VIEW —

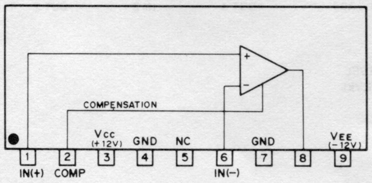




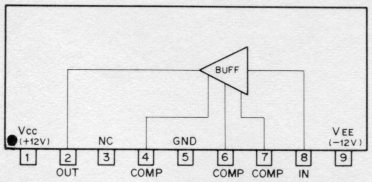
A−OUT; D/A OUTPUT
CK; CLOCK INPUT
D0−7; DIGITAL DATA INPUTS
INV; DIGITAL CODE INVERSION SIGNAL INPUT
I SET; D/A VOLTAGE RANGE CONTROL SIGNAL INPUT



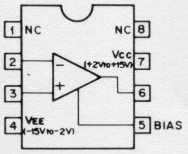
BX365A (SONY)
VIDEO AMPLIFIER
— SIDE VIEW —



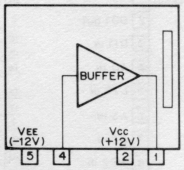
BX366A (SONY)
VIDEO BUFFER
— SIDE VIEW —



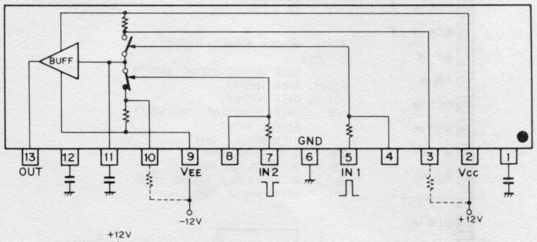
CA3080E (RCA)
OPERATIONAL AMPLIFIER
— TOP VIEW —

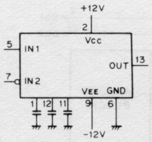


BX3931 (SONY)
BX3931A (SONY)
HYBRID VIDEO WIDEBAND BUFFER AMPLIFIER
— IMPRINTED SIDE —

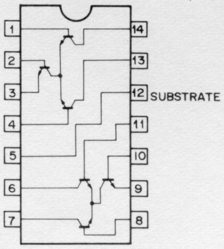


BX381 (SONY)
PHASE COMPARATOR
— SIDE VIEW —

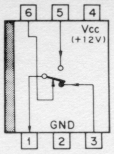




CA3102E (RCA)
HIGH FREQ.DIFFERNTIAL AMPLIFIER
— TOP VIEW —

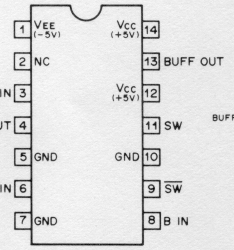


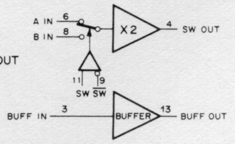
CX20060 (SONY)
ANALOG SWITCH
— TOP VIEW —



CONT. INPUT (PIN6)	SW
LOW OR OPEN	
HIGH	

CX20158 (SONY)
VIDEO SWITCHER AND BUFFER
— TOP VIEW —

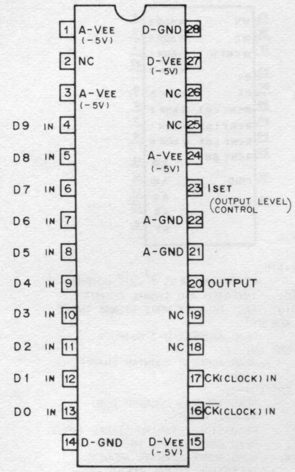


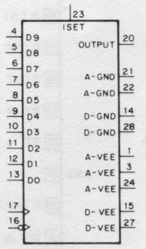


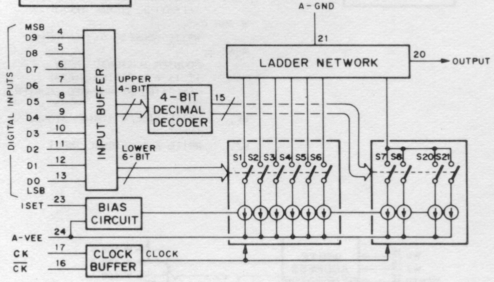
SW	SW̄	INPUT
0	0	—
0	1	B
1	0	A
1	1	—

0; LOW LEVEL
1; HIGH LEVEL
−; INDEFINITE

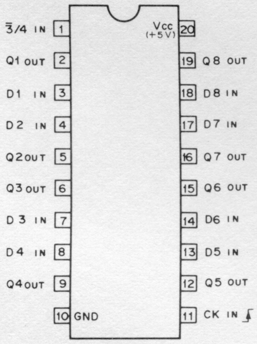
CX20051A (SONY)
10-BIT D/A CONVERTER (ECL INPUT)
— TOP VIEW —

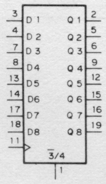






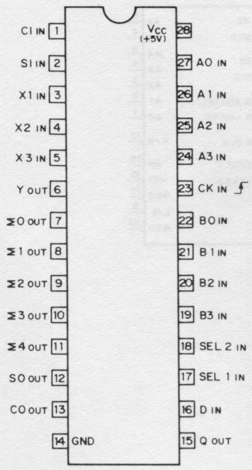
CX20160 (SONY)
TTL OCTAL 3 OR 4 STAGE SHIFT REGISTER
— TOP VIEW —

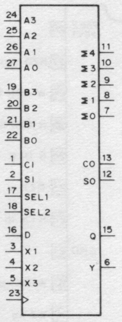




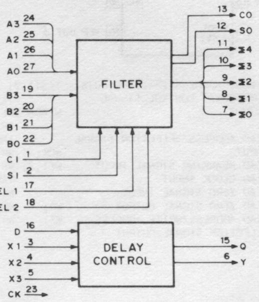
3/4; TOTAL STAGE SELECTION SIGNAL INPUT
H: 4 STAGES, L: 3 STAGES

CX20161 (SONY)
TTL 4-BIT LINE ADDER
— TOP VIEW —

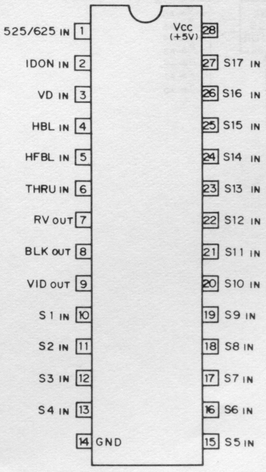


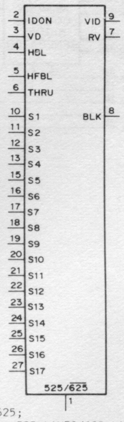


CI ; CARRY INPUT OF 4-BIT ADDER
CO ; CARRY OUTPUT OF 4-BIT ADDER
SI ; DATA B SHIFT SIGNAL INPUT
SO ; DATA B SHIFT SIGNAL OUTPUT

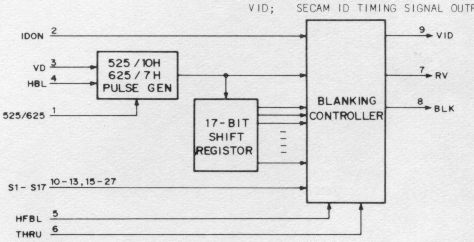


CX20162 (SONY)
BIPOLAR/TTL VERTICAL BLANKING WIDTH CONTROLLER
— TOP VIEW —

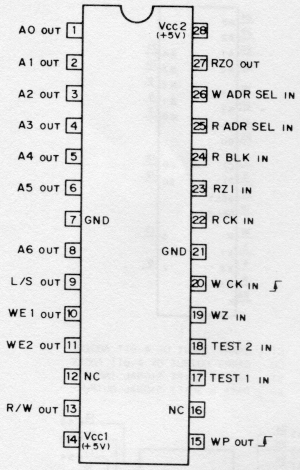


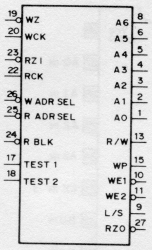


525/625;
525 LINES/625 LINES SETTING INPUT
IDON; SECAM ID ON/OFF SIGNAL INPUT
HBL; H BLANKING SIGNAL INPUT
HFBL; HALF H BLANKING SIGNAL INPUT
THRU; FORCIBLE BLANKING SIGNAL INPUT
S1-S17;
BLANKING LINE SELECTION SWITCH INPUTS
RV; 14TH LINE TIMING SIGNAL OUTPUT
BLK; BLANKING SIGNAL OUTPUT
VID; SECAM ID TIMING SIGNAL OUTPUT

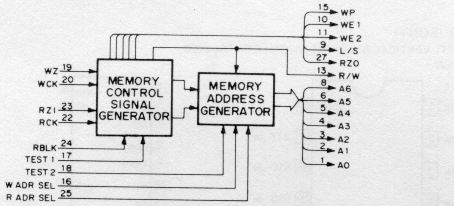


CX20163 (SONY)
BIPOLAR MAIN MEMORY CONTROLLER
— TOP VIEW —

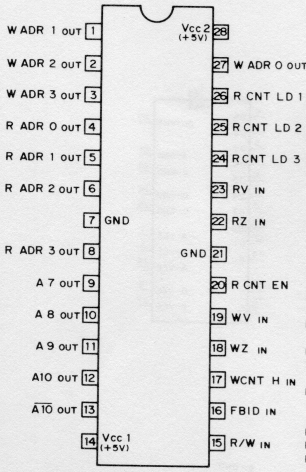


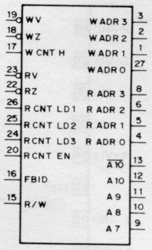


A0–A6; MEMORY ADDRESS 2^0–2^6 OUTPUTS
L/S; LOAD/SHIFT CONTROL SIGNAL OUTPUT
R ADR SEL; READ ADDRESS SELECTION SIGNAL INPUT
RBLK; READ BLANKING SIGNAL INPUT
RCK; READ CLOCK INPUT
RZI; READ ZERO SIGNAL INPUT
RZO; READ ZERO SIGNAL OUTPUT
R/W; READ ADDRESS/WRITE ADDRESS SELECTION SIGNAL OUTPUT
TEST1,2; TEST MODE SIGNAL INPUTS
W ADR SEL; WRITE ADDRESS SELECTION SIGNAL INPUT
WCK; WRITE CLOCK INPUT
WE1,2; WRITE ENABLE SIGNAL OUTPUTS FOR RAM
WEN2 IS THE SAME SIGNAL AS WEN1.
WP; MEMORY WRITE PULSE OUTPUT
WZ; WRITE ZERO SIGNAL INPUT

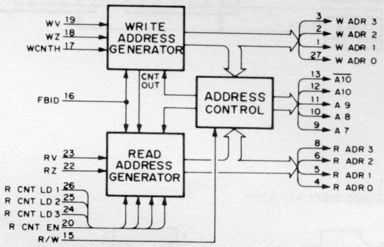


CX20164 (SONY)
BIPOLAR LINE ADDRESS CONTROLLER
— TOP VIEW —



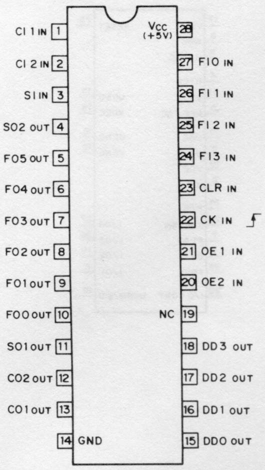


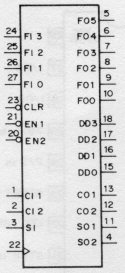
A7–A10; MEMORY ADDRESS 2^7–2^{10} OUTPUTS
$\overline{A10}$; INVERTED A10 SIGNAL OUTPUT
FBID; FAST BIDIREX MODE SIGNAL INPUT
R ADR 0–3; READ ADDRESS 0–3 OUTPUTS
R CNT EN; READ ADDRESS COUNTER ENABLE SIGNAL INPUT
R CNT LD1–3; READ ADDRESS COUNTER LOAD SIGNAL INPUTS
RV; READ SIDE V TIMING SIGNAL INPUT
RZ; READ ZERO SIGNAL INPUT
R/W; READ ADDRESS/WRITE ADDRESS SELECTION SIGNAL INPUT
W ADR 0–3; WRITE ADDRESS 0–3 OUTPUTS
WCNT H; COUNTER H SIGNAL INPUT
IT IS A H TIMING SIGNAL GENERATED BY WCK AFC COUNTER OUT.
WV; WRITE SIDE V TIMING SIGNAL INPUT
WZ; WRITE ZERO SIGNAL INPUT



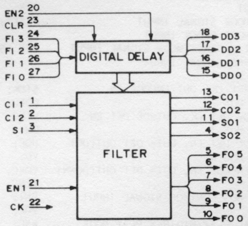
CX20165 (SONY)

TTL 4TH ORDER DIGITAL FILTER WITH 3-STATE OUTPUTS
— TOP VIEW —



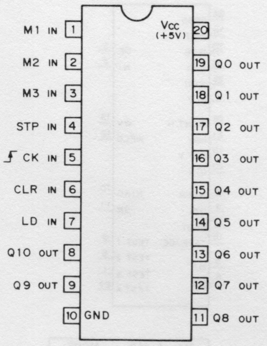


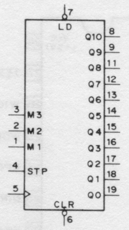
FI0–FI3;
DIGITAL FILTER INPUTS
DD0–DD3;
FI DATA WITH A DELAY OF 5D OUTPUT (3-STATE)
FO0–FO5;
DIGITAL FILTER OUTPUTS (3-STATE)
CI1,2; CARRY INPUTS
CO1,2; CARRY OUTPUTS
SI; SHIFT DATA INPUT
SO1,2; SHIFT DATA OUTPUTS
EN1,2; OUTPUT ENABLE INPUTS
WHEN EN 1 OR 2 IS "H", EACH OUTPUT IS Hi-IMPEDANCE.



CX20194 (SONY)

BIPOLAR 11-BIT SYNCHRONOUS BINARY COUNTER
— TOP VIEW —

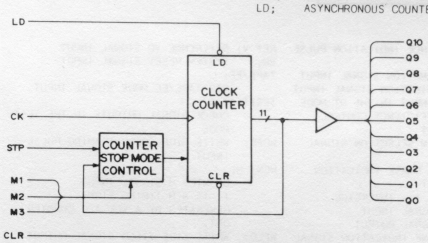




M3	M2	M1	COUNT *
0	0	0	909
0	0	1	910
0	1	0	1024
0	1	1	1135
1	0	0	525
1	0	1	625
1	1	0	1125
1	1	1	2048

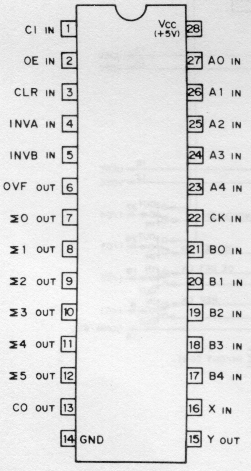
*; DECIMAL NUMBER
0; LOW LEVEL
1; HIGH LEVEL

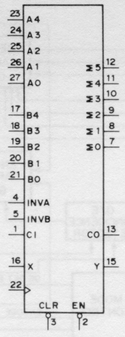
M1,M2,M3;
COUNT LIMIT SETTING SIGNAL INPUT
STP; COUNTER STOP MODE CONTROL INPUT
CLR; SYNCHRONOUS COUNTER CLEAR INPUT
LD; ASYNCHRONOUS COUNTER LOAD INPUT



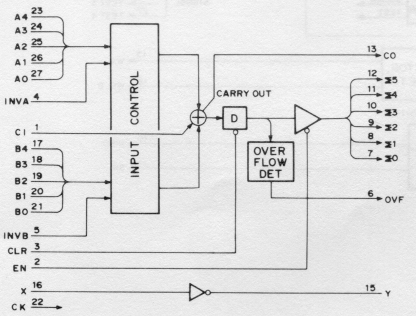
CX20167 (SONY)

TTL 5-BIT FULL ADDER WITH 3-STATE OUTPUTS
— TOP VIEW —





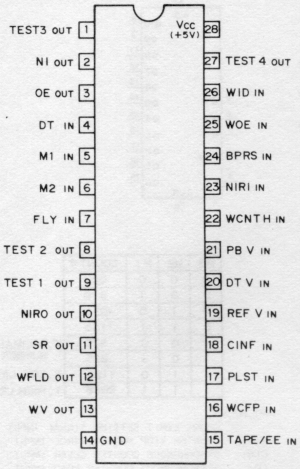
INVA, INVB;
LOGIC LEVEL INVERSION SIGNAL INPUTS
OVF; OVER FLOW SIGNAL OUTPUT
EN; OUTPUT ENABLE SIGNAL INPUT
WHEN EN IS "H", THE OUTPUTS ARE Hi-IMPEDANCE.

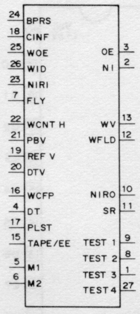


CX20195 (SONY)

BIPOLAR COLOR FRAMING DETECTOR

— TOP VIEW —

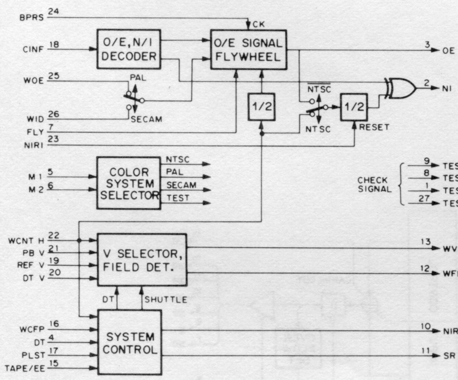




M1	M2	MODE
0	0	TEST
0	1	NTSC
1	0	SECAM
1	1	PAL

0 ; LOW LEVEL
1 ; HIGH LEVEL

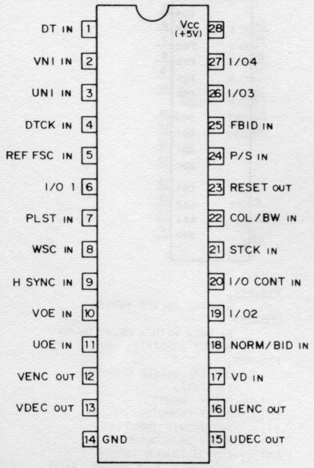
BPRS; BURST PRESENCE INDICATION PULSE INPUT
CINF; COLOR INFORMATION SIGNAL INPUT
DT; DT MODE INDICATION SIGNAL INPUT
DT V; VD SIGNAL INPUT IN THE DT MODE
FLY; FLYWHEEL EFFICIENCY CONTROL SIGNAL INPUT
M1,M2; COLOR SYSTEM SELECTION SIGNAL INPUTS
NI; CHROMA LINE PHASE INDICATION SIGNAL INPUT
N : NORMAL, I : INVERSION
NIRI; NI RESET SIGNAL INPUT
NIRO; NI RESET SIGNAL OUTPUT
OE; ODD/EVEN LINE INDICATION SIGNAL OUTPUT
PB V; OFFTAPE VD INPUT
PLST; VTR PLAY STATUS SIGNAL INPUT
REF V; REFERENCE VD SIGNAL INPUT
SR; SYSTEM RESET SIGNAL INPUT
TAPE/EE; VTR TAPE/EE MODE SIGNAL INPUT
TEST1 TO 4; CHECK SIGNAL OUTPUTS IN THE TEST MODE
WCFP; WRITE SIDE COLOR FRAMING PULSE INPUT
WCNT H; COUNTER H SIGNAL INPUT
IT IS A H TIMING SIGNAL GENERATED BY A WCK AFC COUNTER OUT.
WFLD; WRITE SIDE FIELD SIGNAL OUTPUT
WID; SECAM ID SIGNAL INPUT
WOE; ODD/EVEN LINE INDICATION SIGNAL INPUT
WV; FIELD TOP PULSE OUTPUT

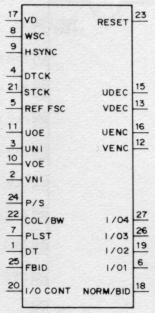


CX20196 (SONY)

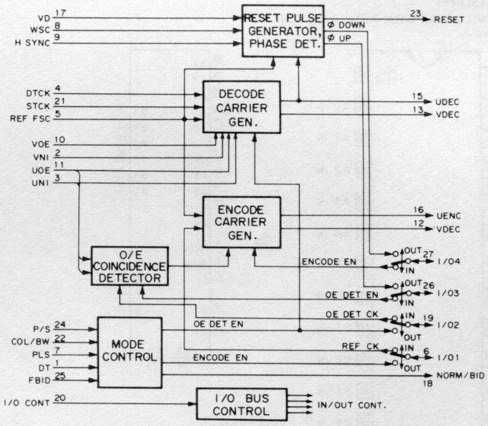
BIPOLAR DECODE/ENCODE CARRIER GENERATOR

— TOP VIEW —

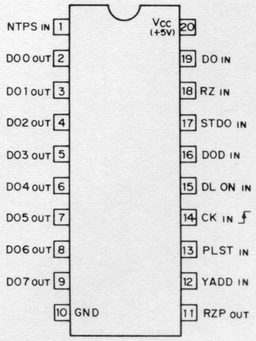


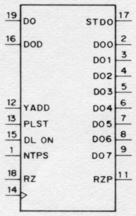


COL/BW; COLOR/BLACK & WHITE MODE SIGNAL INPUT
DT; DT MODE SIGNAL INPUT
DTCK; DT MODE CLOCK INPUT
FBID; FAST BIDIREX MODE SIGNAL INPUT
H SYNC; H SYNC SIGNAL INPUT
I/01; I/O BUS 1
IN=REF CK, OUT=ENCODE EN
I/02; I/O BUS 2
IN=OE DET CK, OUT=OE DET EN
I/03; I/O BUS 3
IN=OE DET EN, OUT= DET OUT(UP)
I/04; I/O BUS 4
IN=ENCODE EN, OUT= DET OUT(DOWN)
I/O CONT; I/O BUS CONTROL SIGNAL INPUT
NORM/BID; NORAL PLAY/BIDIREX PLAY MODE SIGNAL OUTPUT
PLST; VTR PLAY STATUS SIGNAL INPUT
P/S; PAL/SECAM MODE SIGNAL INPUT
RESET; START/STOP VCO RESET SIGNAL OUTPUT
REF FSC; REFERENCE SUBCARRIER FREQUENCY SIGNAL INPUT
STCK; SHUTTLE MODE CLOCK INPUT
UDEC; U AXIS DECODED CARRIER OUTPUT
UENC; U AXIS ENCODED CARRIER OUTPUT
UNI; U AXIS N/I SIGNAL INPUT
UOE; U AXIS O/E SIGNAL INPUT
VD; VERTICAL DRIVE SIGNAL INPUT
VDEC; V AXIS DECODED CARRIER OUTPUT
VENC; V AXIS ENCODED CARRIER OUTPUT
VNI; V AXIS N/I SIGNAL INPUT
VOE; V AXIS O/E SIGNAL INPUT
WSC; WRITE SIDE SUBCARRIER INPUT

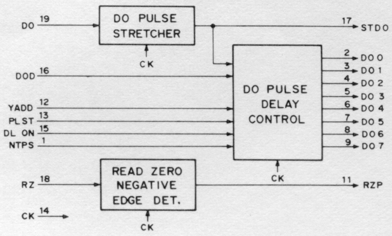


CX20219 (SONY)
BIPOLAR DROPOUT PULSE STRETCHER
— TOP VIEW —

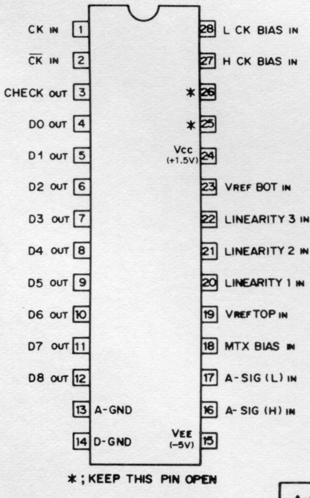




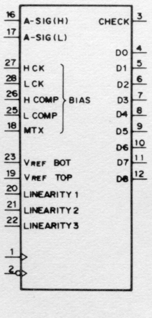
DL ON; 1H DROPOUT MEMORY ON SIGNAL INPUT
DO; DROPOUT SIGNAL INPUT
DO0-10; DELAYED STDO SIGNAL OUTPUTS
DOD; DO SIGNAL INPUT FOR DELAY PROCESS
YADD ON ...1H MEMORY OUT
YADD OFF ..STDO
NTPS; COLOR SYSTEM SELECTION SIGNAL INPUT
NOMALLY, CONNECT TO GND.
PLST; VTR PLAY STATUS SIGNAL INPUT
RZ; READ ZERO SIGNAL INPUT
RZP; READ ZERO PULSE OUTPUT
STDO; STRETCHED DROPOUT SIGNAL OUTPUT
YADD; Y ADDITION INSTRUCTION SIGNAL INPUT
H=YADD ON, L=YADD OFF



CX20220-1DOT (SONY)
9-BIT A/D CONVERTER (ECL OUTPUTS)
— TOP VIEW —



*; KEEP THIS PIN OPEN

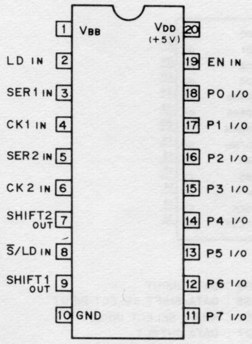


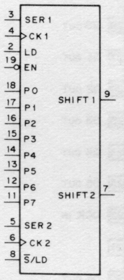
A-SIG(H) ; UPPER-BIT CONV. INPUT
A-SIG(L) ; LOWER-BIT CONV. INPUT
D0 - D9 ; OUTPUTS DATA
CK BIAS ; CLOCK ADJ. INPUTS
COMP BIAS; COMPARATOR ADJ. INPUT
MTX BIAS ; MATRIX ADJ. INPUT
LINEARITY ; LINEARITY ADJ. INPUTS
VREF ; REFERENCE VOLTAGE
CHECK ; CHECK SIGNAL OUTPUT

0; LOW LEVEL
1; HIGH LEVEL

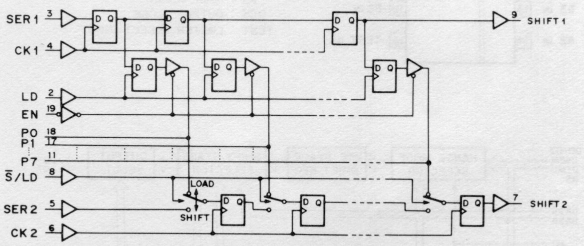
A-SIG	D8	D7	D6	D5	D4	D3	D2	D1	D0
V TOP	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	1	0
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
	1	1	1	1	1	1	1	1	0
V BOT	1	1	1	1	1	1	1	1	1

CX23024 (SONY)
N-MOS 8-BIT SERIAL TO/FROM PARALLEL SHIFT REGISTER
— TOP VIEW —

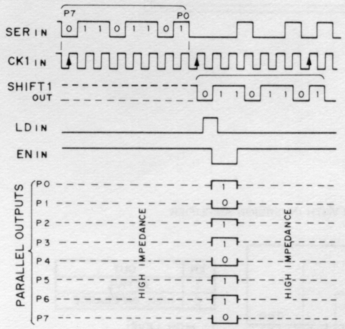




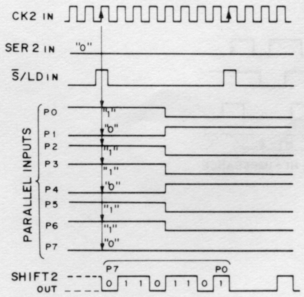
SER ; SERIAL DATA IN
LD ; LOAD IN
EN ; OUTPUT ENABLE IN
S/LD ; SHIFT/LOAD CONTROL IN
SHIFT ; SERIAL SHIFT DATA OUT
P0-P7 ; PARALLEL DATA IN/OUT



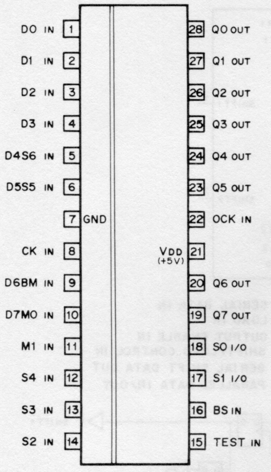
SERIAL → PARALLEL

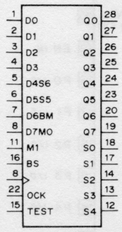


PARALLEL → SERIAL

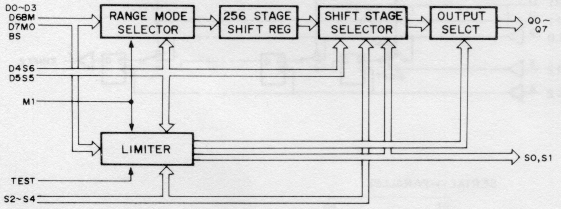


CX23038 (SONY)
C-MOS PROGRAMABLE SHIFT REGISTER
— TOP VIEW —

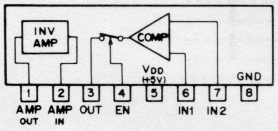




D0~D3	:	DATA INPUT
D4S6, D5S5	:	DATA/SHIFT SELECT INPUT
S0~S4	:	SHIFT SELECT INPUT
Q0~Q7	:	DATA OUTPUT
D6BM	:	DATA/BIT SLICE INPUT
D7MO, M1	:	DATA/RANGE MODE INPUT
BS	:	DATA/BIT SLICE CHANGE INPUT
CK	:	MAIN CLOCK
OCK	:	OUTPUT CLOCK
TEST	:	LIMITER SELECT INPUT



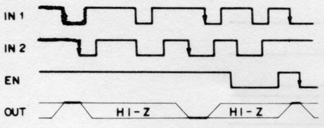
CX23065 (SONY)
N-MOS PHASE COMPARATOR WITH INVERSION AMPLIFIER
— PRINTED SIDE VIEW —



EN	OUT
1	ACTIVE
0	HIGH IMPEDANCE

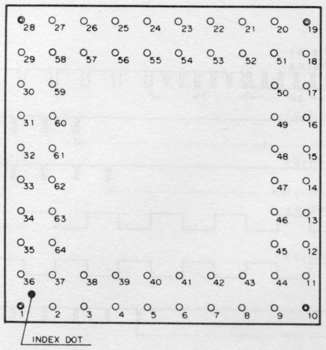
1; HIGH LEVEL
0; LOW LEVEL

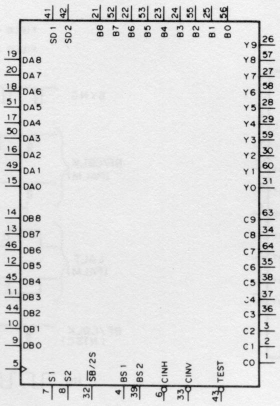
TIMMING CHART



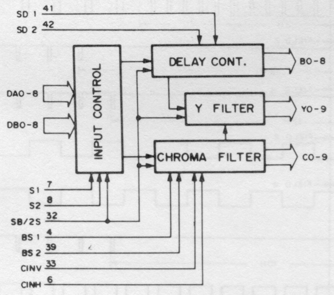
HI-Z ; HI-IMPEDANCE

CX23082 (SONY)
C-MOS DIGITAL Y/C SEPARATION FILTER
— TOP VIEW —





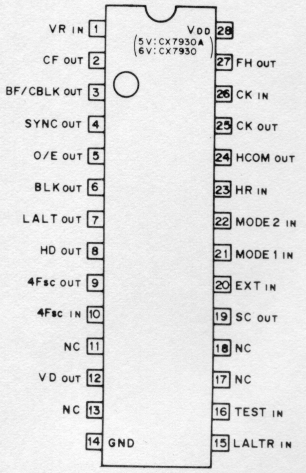
PIN NO.	IN	OUT	SYMBOL	PIN NO.	IN	OUT	SYMBOL	PIN NO.	IN	OUT	SYMBOL	PIN NO.	IN	OUT	SYMBOL
1		O	C0	17	O		DA4	33	O		CINV	49	O		DA1
2		O	C1	18	O		DA6	34		O	C8	50	O		DA3
3		O	C2	19	O		DA8	35		O	C6	51	O		DA5
4	O		BS1	20	O		DA7	36		O	C3	52		O	B7
5	O		CK	21		O	B8	37		O	C4	53		O	B5
6	O		CINH	22		O	B6	38		O	C5	54	O		GND
7	O		S1	23		O	B4	39	O		BS2	55		O	B2
8	O		S2	24		O	B3	40	O		GND	56		O	B0
9	O		DB0	25		O	B1	41	O		SD1	57		O	Y8
10	O		DB1	26		O	Y9	42	O		SD2	58		O	Y6
11	O		DB3	27		O	Y7	43	O		TEST	59		O	Y3
12	O		DB5	28		O	Y5	44	O		DB2	60		O	Y1
13	O		DB7	29		O	Y4	45	O		DB4	61	O		VDD(+5V)
14	O		DB8	30		O	Y2	46	O		DB6	62	O		GND
15	O		DA0	31		O	Y0	47	O		VDD(+5V)	63		O	C9
16	O		DA2	32	O		SB/2S	48	O		GND	64		O	C7

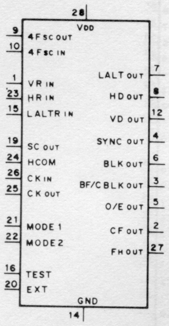


FUNCTIONAL PIN DEFINITION

SYMBOL	PIN NO.	DESCRIPTION
B0	56	
B1	25	
B2	55	
B3	24	
B4	23	BYPASS DATA OUTPUTS
B5	53	
B6	22	
B7	52	
B8	21	
BS1	4	ROUND OFF BIT SELECTION SIGNAL 1 INPUT
BS2	39	ROUND OFF BIT SELECTION SIGNAL 2 INPUT
C0	1	
C1	2	
C2	3	
C3	36	
C4	37	
C5	38	CHROMA DATA OUTPUTS
C6	35	
C7	64	
C8	34	
C9	63	
CK	5	
CINH	6	CHROMA DATA INHIBIT SIGNAL INPUT
CINV	33	CHROMA DATA INVERSION SIGNAL INPUT
DA0	15	
DA1	49	
DA2	16	
DA3	50	
DA4	17	DATA A INPUTS
DA5	51	
DA6	18	
DA7	20	
DA8	19	
DB0	9	
DB1	10	
DB2	44	
DB3	11	
DB4	45	DATA B INPUTS
DB5	12	
DB6	46	
DB7	13	
DB8	14	
S1	7	DATA A/B SELECTION SIGNAL 1 INPUT
S2	8	DATA A/B SELECTION SIGNAL 2 INPUT
SB/2S	32	STRAIGHT BINARY/2'S COMPLEMENT CODE SELECTION SIGNAL INPUT
SD1	41	DELAY CONTROL SIGNAL 1 INPUT
SD2	42	DELAY CONTROL SIGNAL 2 INPUT
TEST	43	TEST MODE SIGNAL INPUT
Y0	31	
Y1	60	
Y2	30	
Y3	59	
Y4	29	Y SIGNAL OUTPUTS
Y5	28	
Y6	58	
Y7	27	
Y8	57	
Y9	26	

CX7930A (SONY) FLAT PACKAGE
C-MOS SYNC GENERATOR (NTSC, PAL-M, PAL, SECAM)
— TOP VIEW —





O/E : ODD/EVEN FIELD
CF : COLOR FRAME PULSE
HCOM : H COMPARATOR

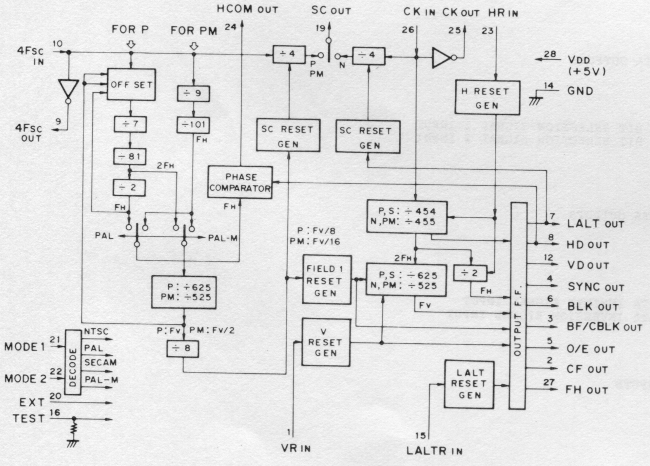
SYSTEM	4Fsc	CLOCK
NTSC	910 FH	910 FH
PAL	1135 FH + 2 FV	908 FH
PALM	909 FH	910 FH
SECAM	——	908 FH

INPUTS		SYSTEM
MODE 1	MODE 2	
0	0	NTSC
0	1	SECAM
1	0	PALM
1	1	PAL

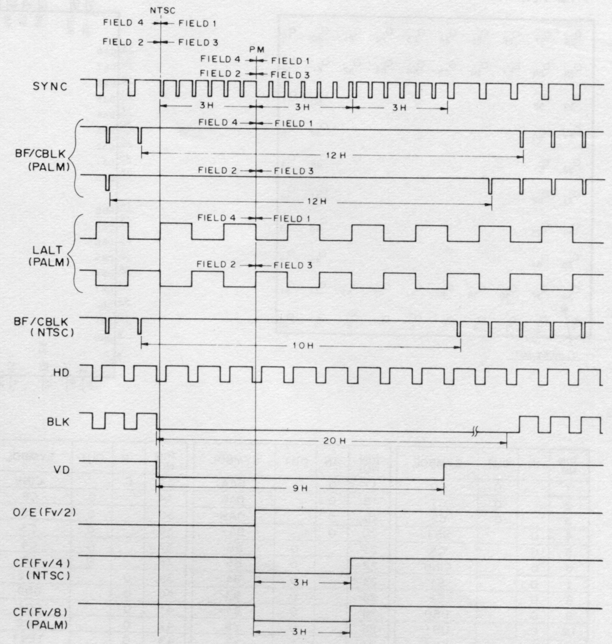
0 ; LOW LEVEL (GND)
1 ; HIGH LEVEL (VDD)

INPUTS		FUNCTION
EXT	TEST	
0	0	INTERNAL
0	1	INVALID
1	0	EXT
1	1	TEST

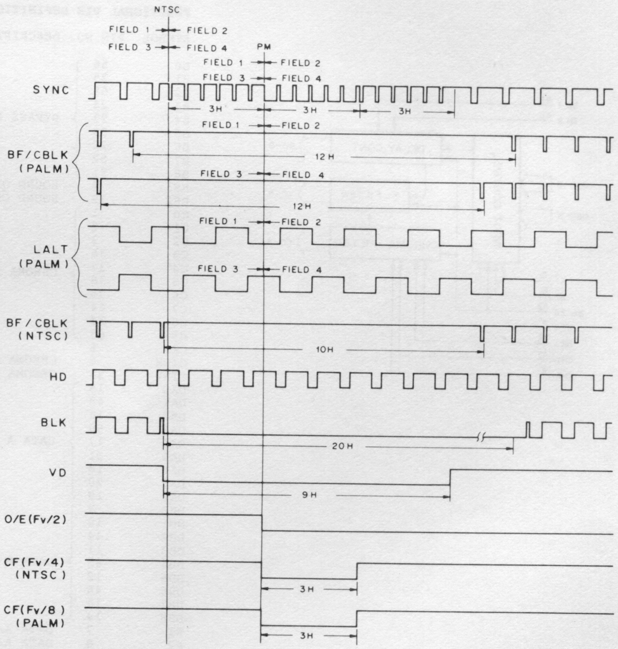
TEST "0" : OPEN
(INTERNALLY PULLED DOWN)

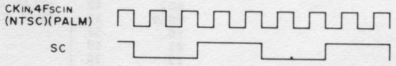


NTSC, PAL-M (FIELD 1, 3)

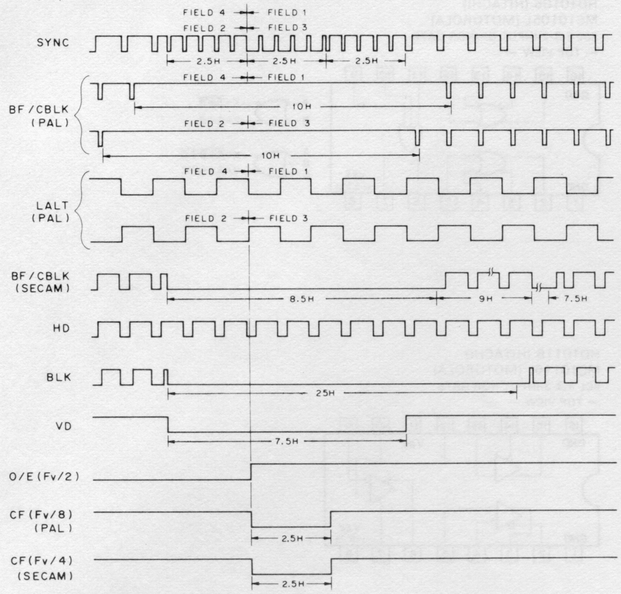


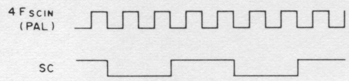
NTSC, PAL-M (FIELD 2, 4)



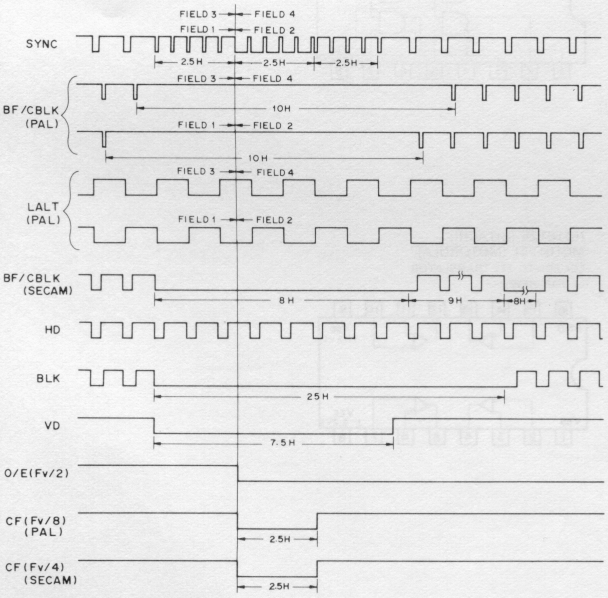


PAL, SECAM (FIELD1,3)

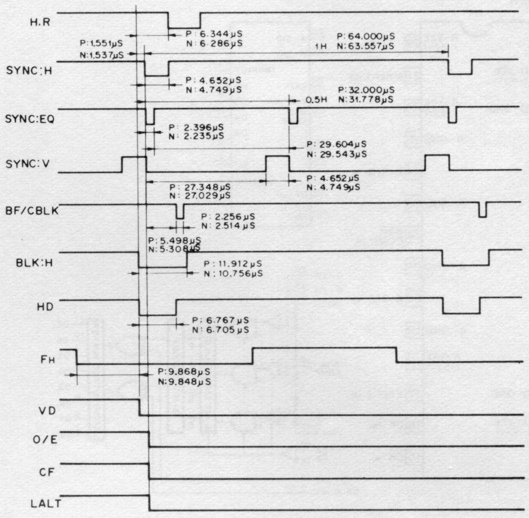




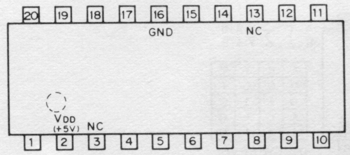
PAL, SECAM (FIELD 4,2)



P: PAL, SECAM
N: NTSC, PALM

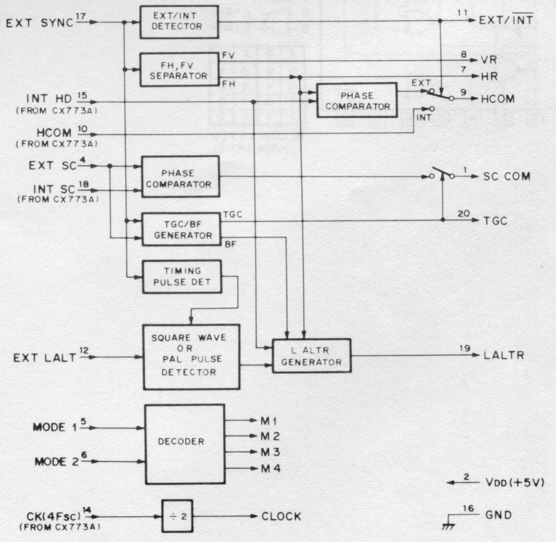


CX7998 (SONY) FLAT PACKAGE
C-MOS GENLOCK DRIVER FOR CX773A
— TOP VIEW —

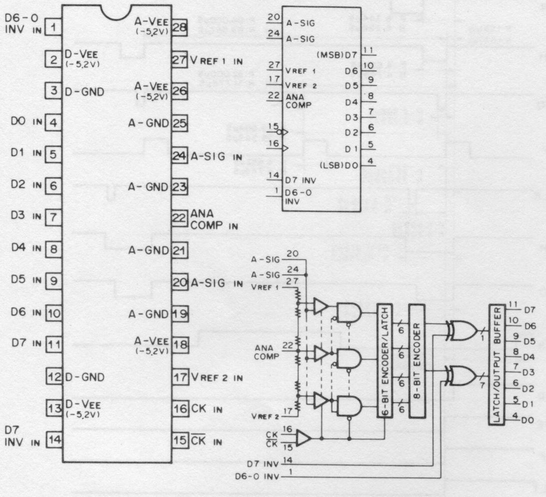


INPUTS		EXT LOCK MODE	
MODE 1	MODE 2		
0	0	M 1	PAL: VBS
1	0	M 2	PAL-M: VBS
0	1	M 3	PAL: VS/SC/LALT
			SECAM: VS/SC/LALT
1	1	M 4	NTSC: VBS
			NTSC: VS/SC
			PAL-M: VS/SC/LALT

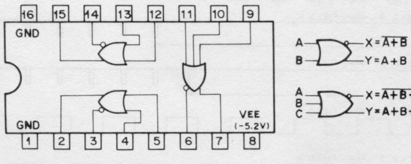
0; LOW LEVEL
1; HIGH LEVEL



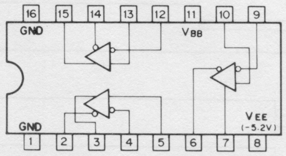
CXA1016D (SONY)
8-BIT FLASH TYPE A/D CONVERTER
— SIDE VIEW —



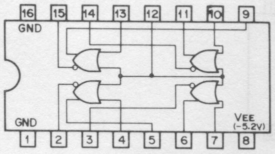
HD10105 (HITACHI)
MC10105L (MOTOROLA)
ECL 2-3-2-INPUT OR/NOR GATE
— TOP VIEW —

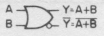


HD10116 (HITACHI)
MC10116L (MOTOROLA)
ECL 4-3-3-INPUT NOR GATE
— TOP VIEW —



HD10101 (HITACHI)
MC10101L (MOTOROLA)
ECL 2-INPUT OR/NOR GATE
— TOP VIEW —

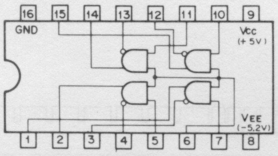




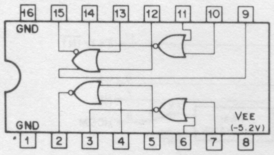
A	B	Y	$\overline{Y}$
0	0	0	1
0	1	1	0
1	0	1	0
1	1	1	0

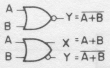
0; LOW LEVEL
1; HIGH LEVEL

HD10124 (HITACHI)
MC10124L (MOTOROLA)
ECL TTL-TO-ECL TRANSLATOR
— TOP VIEW —



HD10102 (HITACHI)
MC10102L (MOTOROLA)
ECL 2-INPUT NOR GATE
— TOP VIEW —

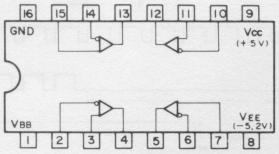




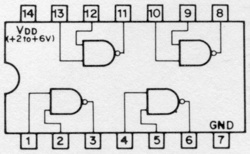
A	B	X	Y
0	0	0	1
0	1	1	0
1	0	1	0
1	1	1	0

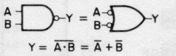
0; LOW LEVEL
1; HIGH LEVEL

HD10125 (HITACHI)
MC10125L (MOTOROLA)
ECL ECL-TO-TTL TRANSLATOR
— TOP VIEW —



HD74HC00P (HITACHI)
MC74HC00N (MOTOROLA)
TC74HC00F (TOSHIBA) FLAT PACKAGE
TC74HC00P (TOSHIBA)
C-MOS 2-INPUT NAND GATE
— TOP VIEW —

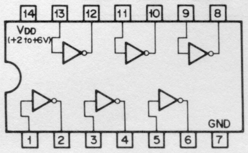


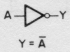


A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

0; LOW LEVEL
1; HIGH LEVEL

HD74HC04P (HITACHI)
MC74HC04N (MOTOROLA)
TC74HC04F (TOSHIBA) FLAT PACKAGE
TC74HC04P (TOSHIBA)
C-MOS INVERTER
— TOP VIEW —

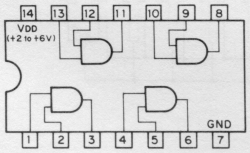


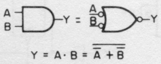


A	Y
0	1
1	0

0: LOW LEVEL
1: HIGH LEVEL

HD74HC08P (HITACHI)
MC74HC08N (MOTOROLA)
TC74HC08F (TOSHIBA) FLAT PACKAGE
TC74HC08P (TOSHIBA)
C-MOS 2-INPUT AND GATE
— TOP VIEW —

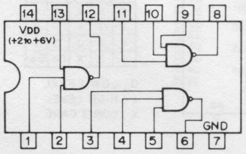


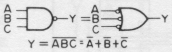


A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

0; LOW LEVEL
1; HIGH LEVEL

HD74HC10P (HITACHI)
MC74HC10N (MOTOROLA)
TC74HC10F (TOSHIBA) FLAT PACKAGE
TC74HC10P (TOSHIBA)
C-MOS 3-INPUT NAND GATE
— TOP VIEW —

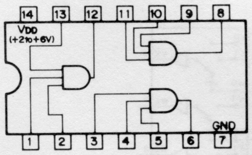


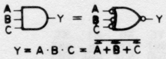


A	B	C	Y
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	0

0 : LOW LEVEL
1 : HIGH LEVEL

HD74HC11P (HITACHI)
MC74HC11N (MOTOROLA)
TC74HC11P (TOSHIBA)
C-MOS 3-INPUT AND GATE

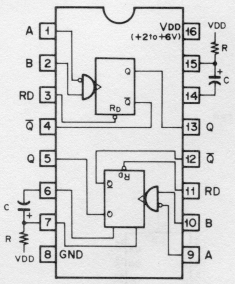




A	B	C	Y
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	1

0; LOW LEVEL
1; HIGH LEVEL

HD74HC123P (HITACHI)
TC74HC123P (TOSHIBA)
C-MOS RETRIGGERABLE MONOSTABLE MULTIVIBRATOR
— TOP VIEW —

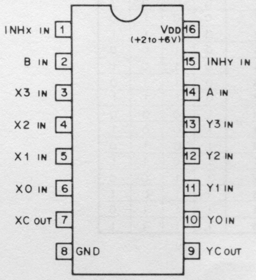


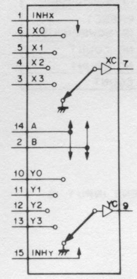
INPUTS			OUTPUTS	
RD	A	B	Q	Q̄
0	X	X	0	1
1	1	X	0	1
1	X	0	0	1
1	0	↑	⊓	⊔
1	↓	1	⊓	⊔
↑	0	1	⊓	⊔

0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE

OUTPUT PULSE WIDTH = 0.46CR

HD74HC153P (HITACHI)
MC74HC153N (MOTOROLA)
TC74HC153F (TOSHIBA) FLAT PACKAGE
TC74HC153P (TOSHIBA)
C-MOS 4-LINE-TO-1-LINE DATA SELECTOR/MULTIPLEXER
— TOP VIEW —

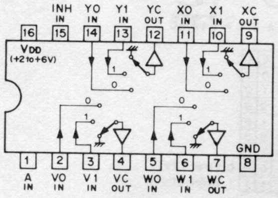


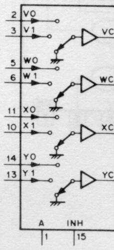


CONTROL IN			ON CHANNEL
INH	B	A	
0	0	0	0
0	0	1	1
0	1	0	2
0	1	1	3
1	X	X	GND

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE

HD74HC157P (HITACHI)
MC74HC157N (MOTOROLA)
TC74HC157P (TOSHIBA)
C-MOS 2-LINE-TO-1-LINE DATA SELECTOR/MULTIPLEXER
— TOP VIEW —

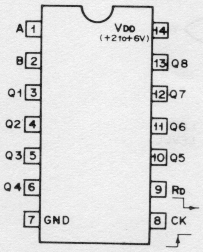


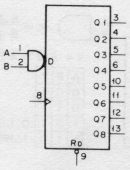


CONT. IN		ON
INH	A	CHANNEL
0	0	0
0	1	1
1	X	GND

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE

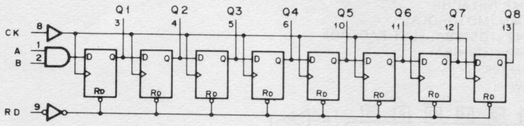
HD74HC164P (HITACHI)
MC74HC164N (MOTOROLA)
TC74HC164P (TOSHIBA)
C-MOS 8-BIT SERIAL-IN/PARALLEL-OUT SHIFT REGISTER
— TOP VIEW —



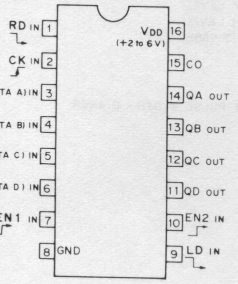


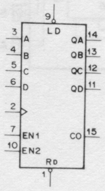
INPUTS				OUTPUTS			
RD	CK	A	B	Q1	Q2	----	Q8
0	X	X	X	0	0	0	0
1	0	X	X	Q1o	Q2o	----	Q8o
1	↑	1	1	1	Q1n	----	Q7n
1	↑	0	X	0	Q1n	----	Q7n
1	↑	X	0	0	Q1n	----	Q7n

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE



HD74HC163P (HITACHI)
MC74HC163N (MOTOROLA)
TC74HC163P (TOSHIBA)
C-MOS PRESETTABLE SYNCHRONOUS 4-BIT BINARY COUNTER
— TOP VIEW —





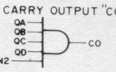
MODE SELECTION

CONTROL INPUTS				MODE
RD	LD	EN1	EN2	
0	X	X	X	RESET (SYNCHRONOUS)
1	0	X	X	PRESET (SYNCHRONOUS)
1	1	0	X	NO COUNT
1	1	X	0	NO COUNT
1	1	1	1	COUNT

COUNT SEQUENCE

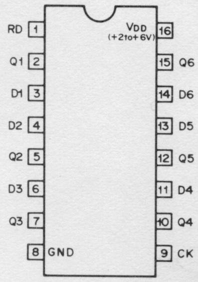
COUNT	OUTPUTS			
	QD	QC	QB	QA
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1
10	1	0	1	0
11	1	0	1	1
12	1	1	0	0
13	1	1	0	1
14	1	1	1	0
15	1	1	1	1

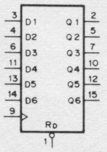
CARRY OUTPUT "CO"



CO IS HIGH WHEN EN2 INPUT IS HIGH AND COUNT IS "15".

HD74HC174P (HITACHI)
MC74HC174N (MOTOROLA)
TC74HC174P (TOSHIBA)
C-MOS D-TYPE FLIP-FLOP WITH RESET
— TOP VIEW —

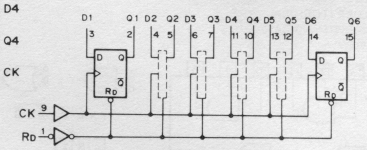




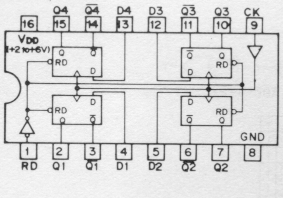
EACH FLIP-FLOP

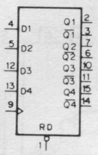
INPUTS			OUT
RD	CK	D	Q
0	X	X	0
1	↑	0	0
1	↑	1	1
1	0	X	Qo

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE



HD74HC175P (HITACHI)
MC74HC175N (MOTOROLA)
TC74HC175F (TOSHIBA) FLAT PACKAGE
TC74HC175P (TOSHIBA)
C-MOS D-TYPE FLIP-FLOP WITH RESET
— TOP VIEW —

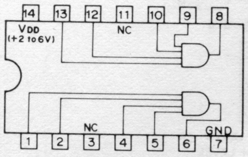


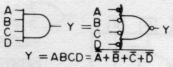


RD	CK	D	Q	Q̄
0	X	X	0	1
1	↑	1	1	0
1	↑	0	0	1
1	0	X	Qo	Q̄o

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE

HD74HC21P (HITACHI)
MC74HC21N (MOTOROLA)
TC74HC21P (TOSHIBA)
C-MOS 4-INPUT POSITIVE AND GATE
— TOP VIEW —



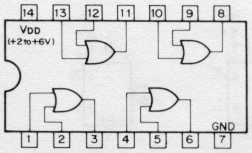


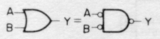
$Y = ABCD = \overline{\bar{A}+\bar{B}+\bar{C}+\bar{D}}$

A	B	C	D	Y
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	0
0	1	0	0	0
:	:	:	:	:
1	1	0	1	0
1	1	1	0	0
1	1	1	1	1

0 ; LOW LEVEL
1 ; HIGH LEVEL

HD74HC32P (HITACHI)
MC74HC32N (MOTOROLA)
TC74HC32P (TOSHIBA)
C-MOS 2-INPUT OR GATE
— TOP VIEW —



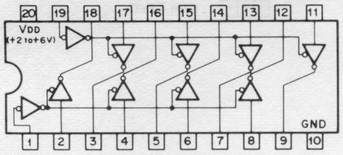


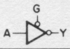
$Y = A + B = \overline{\bar{A} \cdot \bar{B}}$

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

0 ; LOW LEVEL
1 ; HIGH LEVEL

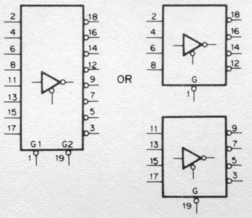
HD74HC240P (HITACHI)
HD74HCT240P (HITACHI)
MC74HC240N (MOTOROLA)
MC74HCT240N (MOTOROLA)
SN74HC240N (TI)
TC74HC240P (TOSHIBA)
TC74HCT240P (TOSHIBA)
C-MOS 3-STATE INVERTER/LINE DRIVER
— TOP VIEW —



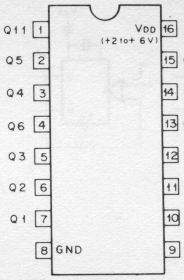


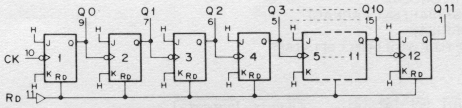
G	A	Y
0	0	1
0	1	0
1	X	HI-Z

0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE
HI-Z ; HIGH IMPEDANCE



HD74HC4040P (HITACHI)
MC74HC4040N (MOTOROLA)
TC74HC4040P (TOSHIBA)
C-MOS 12-STAGE RIPPLE CARRY BINARY COUNTER/DRIVER
— TOP VIEW —



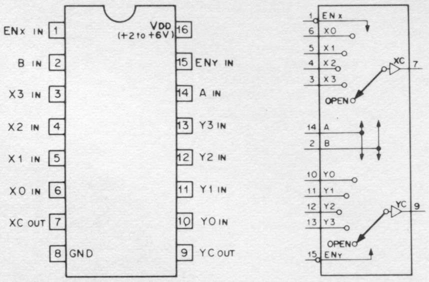


COUNT	Q11	Q10	Q9	Q8	Q7	Q6	Q5	Q4	Q3	Q2	Q1	Q0
0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	1
2	0	0	0	0	0	0	0	0	0	0	1	0
3	0	0	0	0	0	0	0	0	0	0	1	1
:	:	:	:	:	:	:	:	:	:	:	:	:
4095	1	1	1	1	1	1	1	1	1	1	1	1

RD	Q11 ······· Q0
1	ALL LOW
0	COUNT

0 ; LOW LEVEL
1 ; HIGH LEVEL

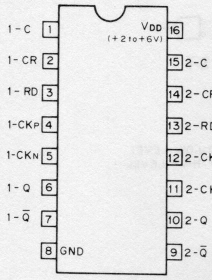
HD74HC253P (HITACHI)
MC74HC253N (MOTOROLA)
TC74HC253P (TOSHIBA)
C-MOS 4-LINE-TO-1-LINE DATA SELECTOR/MULTIPLEXER
— TOP VIEW —

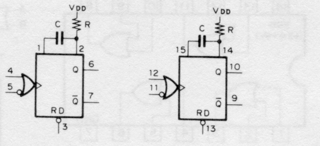


CONTROL IN			ON CHANNEL
EN	B	A	
0	0	0	0
0	0	1	1
0	1	0	2
0	1	1	3
1	X	X	OPEN

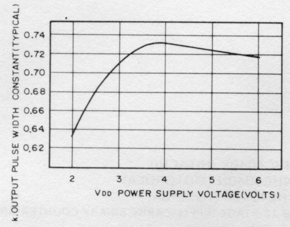
0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE

HD74HC4538P (HITACHI)
MC74HC4538N (MOTOROLA)
TC74HC4538P (TOSHIBA)
C-MOS DUAL RETRIGGERABLE/NON-RETRIGGERABLE MONOSTABLE MULTIVIBRATOR
— TOP VIEW —



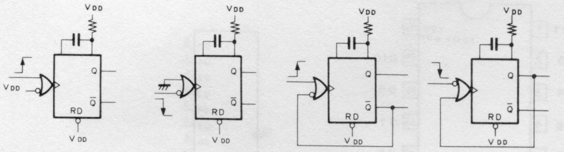


OUTPUT PULSE WIDTH = k·C·R

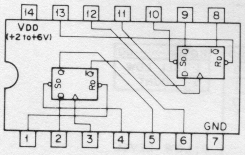


RETRIGGERABLE M.M.V

NON-RETRIGGERABLE M.M.V



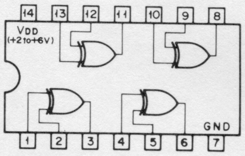
HD74HC74P (HITACHI)
MC74HC74N (MOTOROLA)
TC74HC74F (TOSHIBA) FLAT PACKAGE
TC74HC74P (TOSHIBA)
C-MOS D-TYPE FLIP FLOP WITH DIRECT SET/RESET
— TOP VIEW —

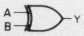


INPUTS				OUTPUTS	
SD	RD	CK	D	Qn+1	$\overline{Qn+1}$
0	1	X	X	1	0
1	0	X	X	0	1
0	0	X	X	1*	1*
1	1	↑	1	1	0
1	1	↑	0	0	1
1	1	0	X	Qn	$\overline{Qn}$

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE
1*; NONSTABLE

HD74HC86P (HITACHI)
MC74HC86N (MOTOROLA)
TC74HC86F (TOSHIBA) FLAT PACKAGE
TC74HC86P (TOSHIBA)
C-MOS EXCLUSIVE OR GATE
— TOP VIEW —



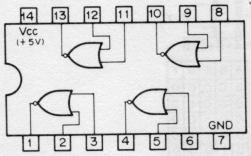


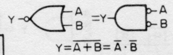
$Y = \overline{A} \cdot B + A \cdot \overline{B}$

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	0

0; LOW LEVEL
1; HIGH LEVEL

HD74LS02P (HITACHI)
SN74LS02N (TI)
TTL 2-INPUT POSITIVE-NOR GATE
— TOP VIEW —



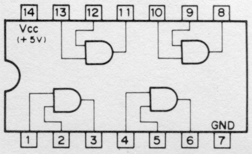


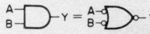
$Y = \overline{A+B} = \overline{A} \cdot \overline{B}$

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0

0: LOW LEVEL
1; HIGH LEVEL

HD74LS08P (HITACHI)
SN74LS08N (TI)
TTL 2-INPUT POSITIVE-AND GATE
— TOP VIEW —



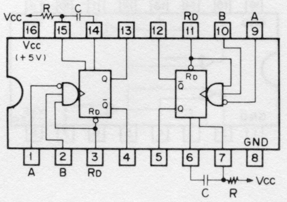


$Y = A \cdot B = \overline{\overline{A} + \overline{B}}$

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

0; LOW LEVEL
1; HIGH LEVEL

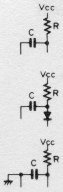
HD74LS123P (HITACHI)
SN74LS123N (TI)
TTL RETRIGGERABLE MONOSTABLE MULTIVIBRATOR WITH DIRECT RESET
— TOP VIEW —



INPUTS			OUTPUTS	
RD	A	B	Q	Q̄
0	X	X	0	1
X	1	X	0	1
X	X	0	0	1
1	0	↑	⊓	⊔
1	↓	1	⊓	⊔
↑	0	1	⊓	⊔

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE

OUTPUT PULSE WIDTH



'123 ; $T_W = 0.28\left(1+\frac{700}{R}\right)CR$

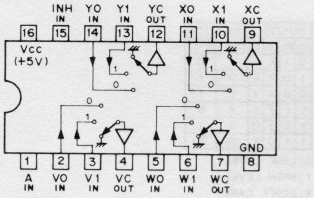
'L123; $T_W = 0.33\left(1+\frac{700}{R}\right)CR$

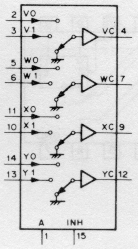
'123 ; $T_W = 0.25\left(1+\frac{700}{R}\right)CR$

'L123; $T_W = 0.29\left(1+\frac{700}{R}\right)CR$

'LS123; $T_W = 0.45CR$

HD74LS157P (HITACHI)
SN74LS157N (TI)
TTL 2-LINE-TO-1-LINE DATA SELECTOR/MULTIPLEXER
— TOP VIEW —

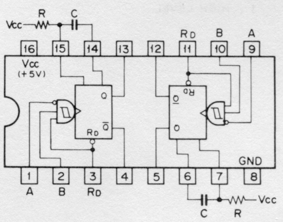




CONT. IN		ON CHANNEL
INH	A	
0	0	0
0	1	1
1	X	GND

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE

HD74LS221P (HITACHI)
SN74LS221N (TI)
TTL MONOSTABLE MULTIVIBRATOR WITH SCHMITT TRIGGER INPUT
— TOP VIEW —

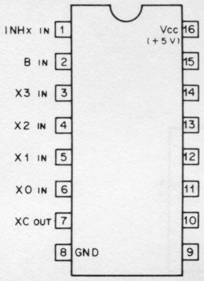


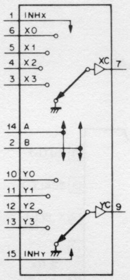
INPUTS			OUTPUTS	
RD	A	B	Q	Q̄
0	X	X	0	1
X	1	X	0	1
X	X	0	0	1
1	0	↑	⊓	⊔
1	↓	1	⊓	⊔
↑	0	1	⊓	⊔

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE

OUTPUT PULSE WIDTH = 0.7CR

HD74LS153P (HITACHI)
SN74LS153N (TI)
TTL 4-LINE-TO-1-LINE DATA SELECTOR/MULTIPLEXER
— TOP VIEW —

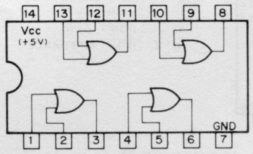


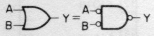


CONTROL IN			ON CHANNEL
INH	B	A	
0	0	0	0
0	0	1	1
0	1	0	2
0	1	1	3
1	X	X	GND

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE

HD74LS32P (HITACHI)
SN74LS32N (TI)
TTL 2-INPUT POSITIVE-OR GATE
— TOP VIEW —



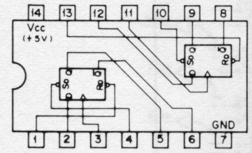


$Y = A + B = \overline{\bar{A} \cdot \bar{B}}$

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

0: LOW LEVEL
1: HIGH LEVEL

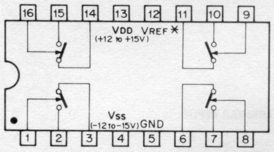
HD74LS74AP (HITACHI)
MC74F74N (MOTOROLA)
SN74LS74AN (TI)
TTL D-TYPE FLIP FLOP WITH DIRECT SET/RESET
— TOP VIEW —

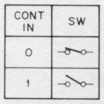


INPUTS				OUTPUTS	
SD	RD	CK	D	Qn+1	$\overline{Q_{n+1}}$
0	1	X	X	1	0
1	0	X	X	0	1
0	0	X	X	1*	1*
1	1	↑	1	1	0
1	1	↑	0	0	1
1	1	0	X	Qn	$\overline{Q_n}$

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE
1*; NONSTABLE

HI1-0201-5 (HARRIS)
HI1-201 (HARRIS)
C-MOS ANALOG SWITCH
— TOP VIEW —



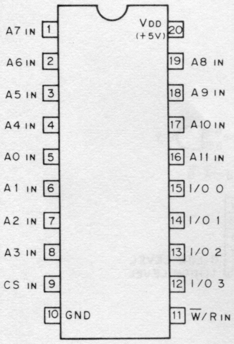


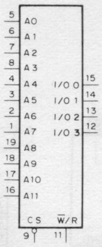
0 ; LOW LEVEL
1 ; HIGH LEVEL

*NOTE

INTERFACIAL DEVICE		VREF CONNECTION
TTL		Open
C-MOS	VDD ≦ 5.5V	Open
	VDD > 5.5V	To VDD of interfacial IC

HM6168HP-45 (HITACHI) (ACCESS TIME = 45 nS)
HM6168HP-55 (HITACHI) (ACCESS TIME = 55 nS)
HM6168HP-70 (HITACHI) (ACCESS TIME = 70 nS)
N-MOS 16384-BIT(4096x4) STATIC RAM
— TOP VIEW —

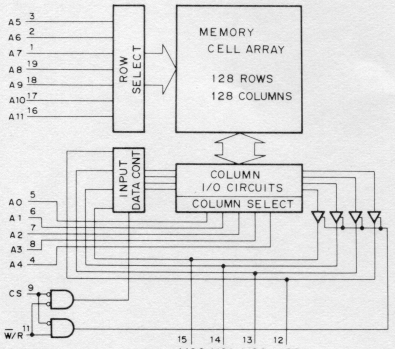




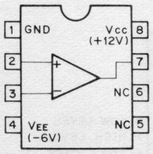
INPUTS		MODE
CS	$\overline{W}$/R	
0	0	WRITE
0	1	READ
1	X	DISABLE (OUTPUT; HI-Z)

0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE
HI-Z ; HIGH IMPEDANCE

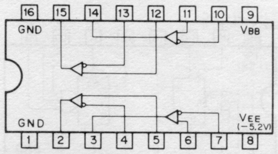
A0~A11 ; ADDRESS INPUTS
I/O0~I/O3 ; DATA INPUTS/OUTPUTS
CS ; CHIP SELECT INPUT
$\overline{W}$/R ; WRITE/READ ENABLE INPUT



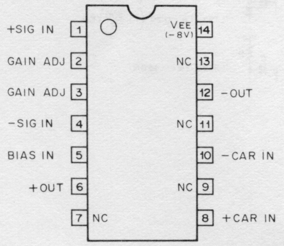
MB4002 (FUJITSU)
HIGH SPEED VOLTAGE COMPARATOR
— TOP VIEW —

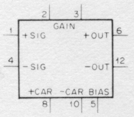


MC10115L (MOTOROLA)
ECL LINE RECEIVER
— TOP VIEW —

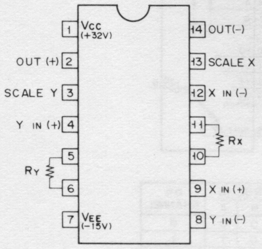


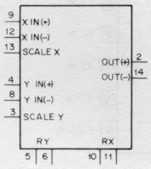
MC1496M (MOTOROLA) FLAT PACKAGE
MC1496P (MOTOROLA)
NJM1496M (JRC) FLAT PACKAGE
uA796PC (FSC)
BALANCED MODULATOR/DEMODULATOR
— TOP VIEW —



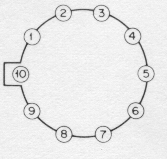


MC1595L (MOTOROLA)
LINEAR MULTIPLIER
— TOP VIEW —

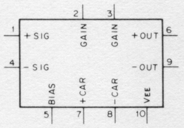




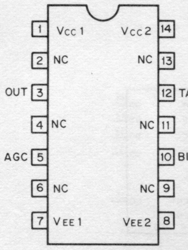
MC1596G (MOTOROLA)
DOUBLE-BALANCED MOD/DEMOD.
— BOTTOM VIEW —

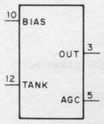


1 +SIGNAL INPUT
2 GAIN ADJUST
3 GAIN ADJUST
4 -SIGNAL INPUT
5 BIAS
6 +OUTPUT
7 +CARRIER INPUT
8 -CARRIER INPUT
9 -OUTPUT
10 VEE



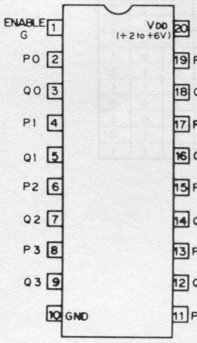
MC1648P (MOTOROLA)
ECL VOLTAGE CONTROLLED OSCILLATOR
— TOP VIEW —

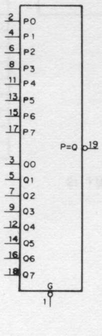


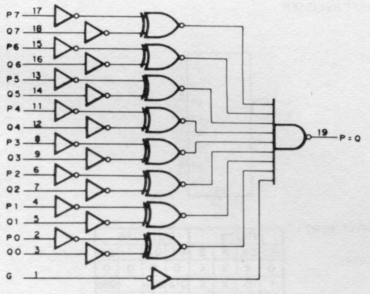


Supply Voltage	Supply Pins	GND Pins
+5.0 Vdc	1, 14	7, 8
−5.2 Vdc	7, 8	1, 14

MC74HC688N (MOTOROLA)
TC74HC688P (TOSHIBA)
C-MOS 8-BIT MAGNITUDE COMPARATOR



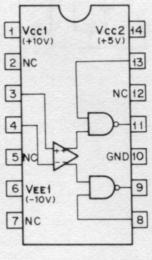




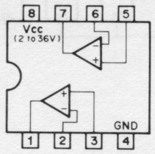
INPUTS		OUTPUT
P, Q	G	P = Q
P=Q	0	0
P>Q	0	1
P<Q	0	1
X	1	1

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE

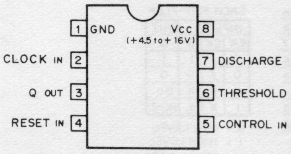
NE527N (SIGNETICS)
VOLTAGE COMPARATOR
— TOP VIEW —

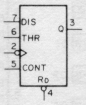


NJM2903D (JRC)
uPC393C (NEC)
VOLTAGE COMPARATOR
— TOP VIEW —

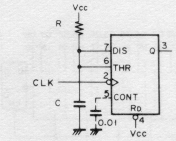


NJM555D (JRC)
PRECISION TIMER
— TOP VIEW —



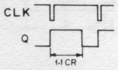


MONOSTABLE MULTIVIBRATOR

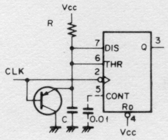


INPUTS		OUT
RD	CLK	Q
0	X	0
1	⌐	⌐⌐

0, LOW LEVEL
1, HIGH LEVEL
X, DON'T CARE

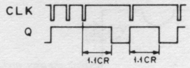


RETRIGGERABLE MONO. MULTIVIBRATOR
(MISSING PULSE DETECTOR)

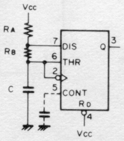


INPUTS		OUT
RD	CLK	Q
0	X	0
1	⌐	⌐⌐

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE

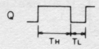


ASTABLE MULTIVIBRATOR



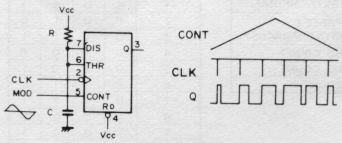
RD	Q
0	0
1	⌐⌐

0; LOW LEVEL
1; HIGH LEVEL

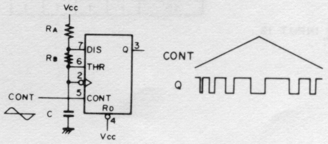


$T_H = 0.693C\ (R_A + R_B)$
$T_L = 0.693C\ R_B$

PULSE WIDTH MODULATOR



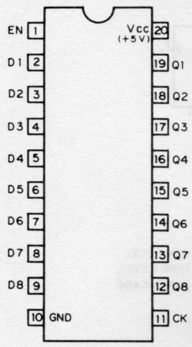
VCO
(PULSE POSITION MODULATOR)

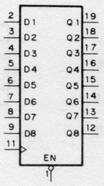


SN74ALS574N (TI)

TTL 3-STATE D-TYPE EDGE-TRIGGERED FLIP-FLOP

— TOP VIEW —

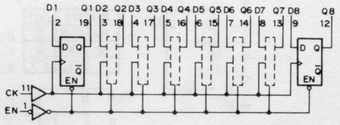




EACH FLIP-FLOP

INPUTS			OUT
EN	CK	D	Q
0	↑	1	1
0	↑	0	0
0	0	X	Qo
1	X	X	HI-Z

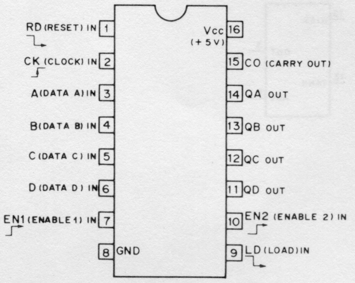
0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE
HI-Z ; HIGH IMPEDANCE

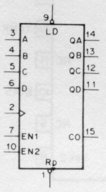


SN74LS163AN (TI)

TTL PRESETTABLE SYNCHRONOUS 4-BIT BINARY COUNTER

— TOP VIEW —





MODE SELECTION

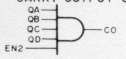
CONTROL INPUTS				MODE
RD	LD	EN1	EN2	
0	X	X	X	RESET (SYNCHRONOUS)
1	0	X	X	PRESET (SYNCHRONOUS)
1	1	0	X	NO COUNT
1	1	X	0	NO COUNT
1	1	1	1	COUNT

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE

COUNT SEQUENCE

COUNT	OUTPUTS			
	QD	QC	QB	QA
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1
10	1	0	1	0
11	1	0	1	1
12	1	1	0	0
13	1	1	0	1
14	1	1	1	0
15	1	1	1	1

CARRY OUTPUT "CO"

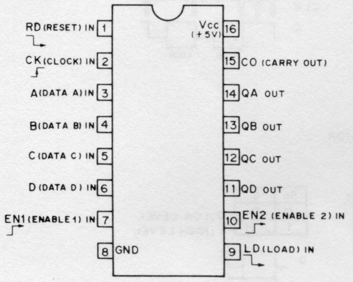


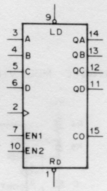
CO IS HIGH WHEN EN2 INPUT IS HIGH AND COUNT IS "15".

SN74LS161AN (TI)

TTL PRESETTABLE SYNCHRONOUS 4-BIT BINARY COUNTER

— TOP VIEW —





MODE SELECTION

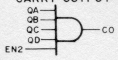
CONTROL INPUTS				MODE
RD	LD	EN1	EN2	
0	X	X	X	RESET (ASYNCHRONOUS)
1	0	X	X	PRESET (SYNCHRONOUS)
1	1	0	X	NO COUNT
1	1	X	0	NO COUNT
1	1	1	1	COUNT

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE

COUNT SEQUENCE

COUNT	OUTPUTS			
	QD	QC	QB	QA
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1
10	1	0	1	0
11	1	0	1	1
12	1	1	0	0
13	1	1	0	1
14	1	1	1	0
15	1	1	1	1

CARRY OUTPUT "CO"

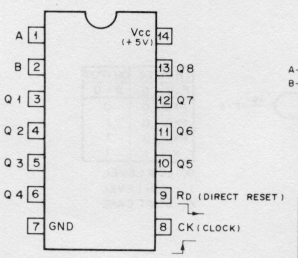


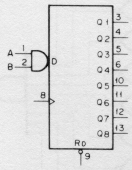
CO IS HIGH WHEN EN2 INPUT IS HIGH AND COUNT IS "15".

SN74LS164N (TI)

TTL 8-BIT PARALLEL-OUT SERIAL SHIFT REGISTER

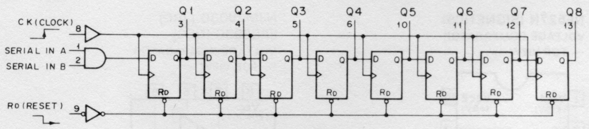
— TOP VIEW —



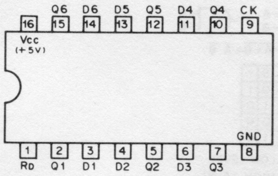


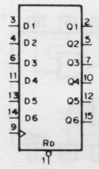
INPUTS				OUTPUTS			
RD	CK	A	B	Q1	Q2	----	Q8
0	X	X	X	0	0	0	0
1	0	X	X	Q1o	Q2o	----	Q8o
1	↑	1	1	1	Q1n	----	Q7n
1	↑	0	X	0	Q1n	----	Q7n
1	↑	X	0	0	Q1n	----	Q7n

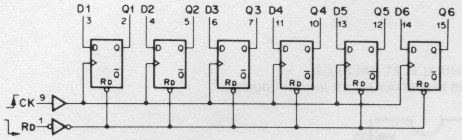
0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE



SN74LS174N (TI)
TTL D-TYPE FLIP-FLOP WITH DIRECT RESET
— TOP VIEW —





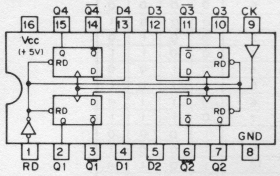


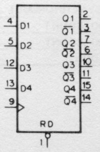
EACH FLIP-FLOP

INPUTS			OUT
RD	CK	D	Q
0	X	X	0
1	↑	0	0
1	↑	1	1
1	0	X	Qo

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE

SN74LS175N (TI)
TTL D-TYPE FLIP-FLOP WITH CLEAR
— TOP VIEW —

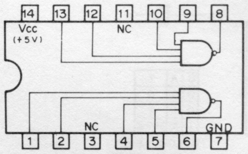


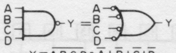


RD	CK	D	Q	$\overline{Q}$
0	X	X	0	1
1	↑	1	1	0
1	↑	0	0	1
1	0	X	Qo	$\overline{Q}$o

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE

SN74LS20N (TI)
TTL 4-INPUT POSITIVE NAND GATE
— TOP VIEW —



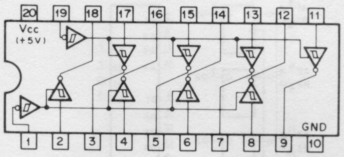


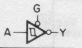
$Y = \overline{A \cdot B \cdot C \cdot D} = \overline{A} + \overline{B} + \overline{C} + \overline{D}$

A	B	C	D	Y
0	0	0	0	1
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	1
⋮	⋮	⋮	⋮	⋮
1	1	0	1	1
1	1	1	0	1
1	1	1	1	0

0; LOW LEVEL
1; HIGH LEVEL

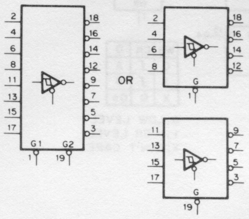
SN74LS240N (TI)
TTL 3-STATE SCHMITT TRIGGER INVERTER/LINE DRIVER
— TOP VIEW —



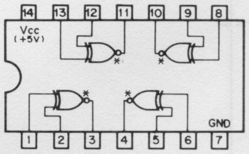


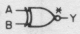
G	A	Y
0	0	1
0	1	0
1	X	HI-Z

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE
HI-Z; HIGH IMPEDANCE



SN74LS266N (TI)
TTL 2-INPUT EXCLUSIVE-NOR GATE WITH OPEN-COLLECTOR OUTPUT
— TOP VIEW —

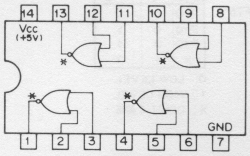


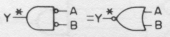


A	B	Y
0	0	1
0	1	0
1	0	0
1	1	1

0; LOW LEVEL
1; HIGH LEVEL

SN74LS33N (TI)
TTL 2-INPUT POSITIVE-NOR GATE WITH OPEN-COLLECTOR
— TOP VIEW —



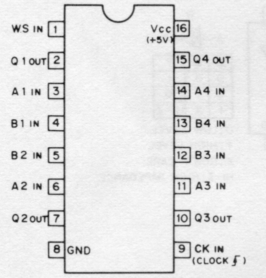


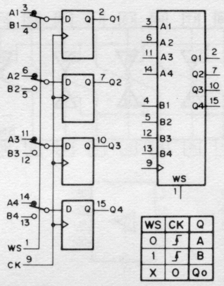
$Y = \overline{A + B} = \overline{A} \cdot \overline{B}$

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0

0: LOW LEVEL
1: HIGH LEVEL

SN74LS399N (TI)
TTL QUAD 2-INPUT MULTIPLEXER WITH STORAGE
— TOP VIEW —



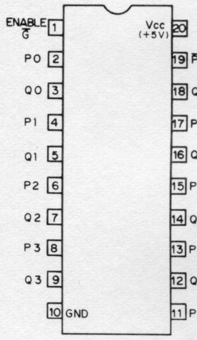


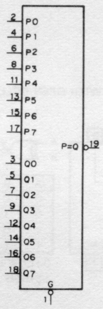
WS	CK	Q
0	ʃ	A
1	ʃ	B
X	0	Qo

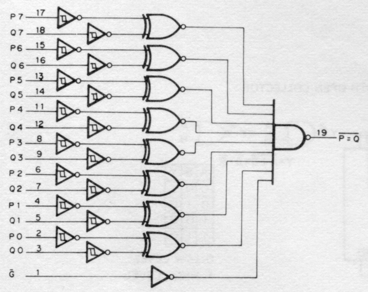
0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE

WS; WORD SELECT

SN74LS688N (TI)
TTL 8-BIT MAGNITUDE COMPARATOR



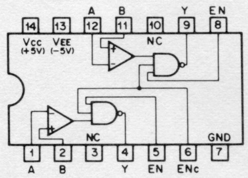




INPUTS P,Q	G̅	OUTPUT P=Q̅
P=Q	0	0
P>Q	0	1
P<Q	0	1
X	1	1

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE

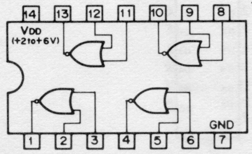
SN75207BN (TI)
BIPOLAR LINE RECEIVER (TTL COMPATIBLE)
— TOP VIEW —

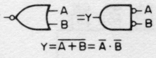


INPUTS B−A	EN	ENc	OUT Y
B−A ≧ 10mV	X	0	1
	0	X	1
	1	1	0
|B−A| < 10mV	X	0	1
	0	X	1
	1	1	*
B−A ≦ −10mV	X	X	1

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE
*; INDETERMINATE

TC74HC02F (TOSHIBA) FLAT PACKAGE
C MOS 2-INPUT POSITIVE-NOR GATE
— TOP VIEW —

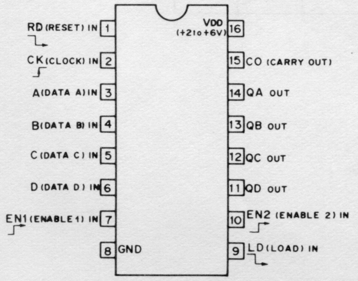


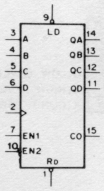


A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0

0; LOW LEVEL
1; HIGH LEVEL

TC74HC161F (TOSHIBA) FLAT PACKAGE
C-MOS SYNCHRONOUS PRESETTABLE 4-BIT BINARY COUNTER
— TOP VIEW —



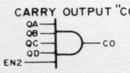


MODE SELECTION

CONTROL INPUTS RD	LD	EN1	EN2	MODE
0	X	X	X	RESET (ASYNCHRONOUS)
1	0	X	X	PRESET (SYNCHRONOUS)
1	1	0	X	NO COUNT
1	1	X	0	NO COUNT
1	1	1	1	COUNT

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE

CARRY OUTPUT "CO"

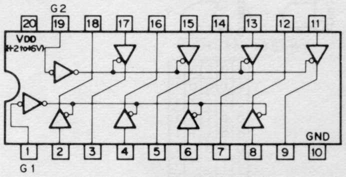


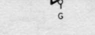
CO IS HIGH WHEN EN2 INPUT IS HIGH AND COUNT IS "15".

COUNT SEQUENCE

COUNT	OUTPUTS QD	QC	QB	QA
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1
10	1	0	1	0
11	1	0	1	1
12	1	1	0	0
13	1	1	0	1
14	1	1	1	0
15	1	1	1	1

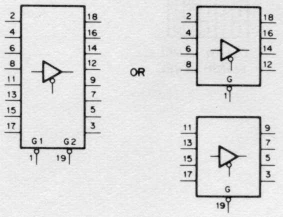
TC74HC244P (TOSHIBA)
TC74HCT244P (TOSHIBA)
C-MOS BUS BUFFER WITH 3-STATE OUTPUT
— TOP VIEW —



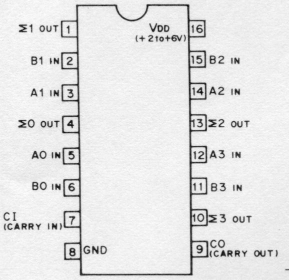


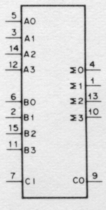
G	A	Y
0	0	0
0	1	1
1	X	HI-Z

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE
HI-Z; HIGH IMPEDANCE



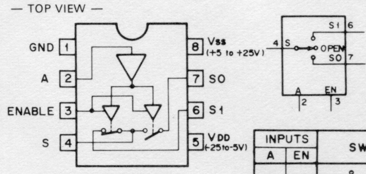
TC74HC283P (TOSHIBA)
C-MOS 4-BIT FULL ADDER
— TOP VIEW —





2^4	2^3	2^2	2^1	2^0	DIGIT
				CI	CARRY IN
	A3	A2	A1	A0	DATA A IN
+)	B3	B2	B1	B0	DATA B IN
CO	Σ3	Σ2	Σ1	Σ0	CARRY&SUM OUT
EX.				1	CI
	1	0	1	1	A
+)	1	0	1	0	B
1	0	1	1	0	OUTPUTS
CO	Σ3	Σ2	Σ1	Σ0	

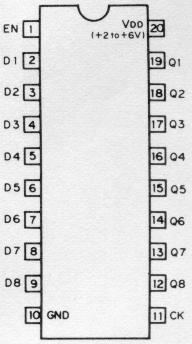
TL607CP (TI)
P-MOS ANALOG SWITCH
— TOP VIEW —

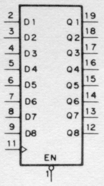


INPUTS		SW
A	EN	
X	0	OPEN
0	1	6 7
1	1	6 7

0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE

TC74HC574F (TOSHIBA)
TC74HCT574P (TOSHIBA)
C-MOS 3-STATE D-TYPE EDGE-TRIGGERED FLIP-FLOP
— TOP VIEW —

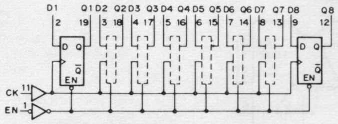




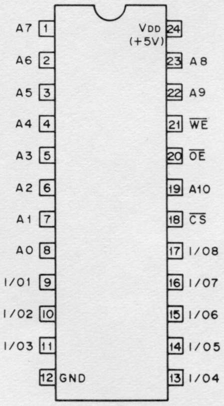
EACH FLIP-FLOP

INPUTS			OUT
EN	CK	D	Q
0	↑	1	1
0	↑	0	0
0	0	X	Qo
1	X	X	HI-Z

0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE
HI-Z ; HIGH IMPEDANCE

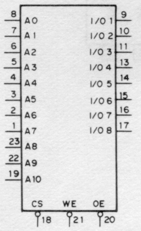


TMM2015AP-90 (TOSHIBA) (ACCESS TIME = 90 nS)
N-MOS 16K STATIC RAM (2048x8)
— TOP VIEW —

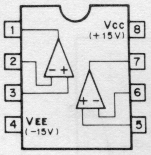


MODE	$\overline{CS}$	$\overline{WE}$	$\overline{OE}$
WRITE	0	0	X
READ	0	1	0
STANDBY	1	X	X

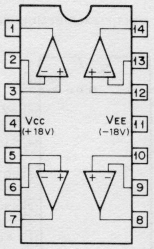
0; LOW LEVEL
1; HIGH LEVEL
X; DON'T CARE



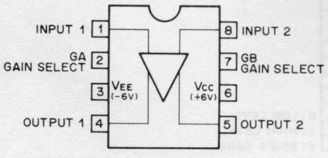
TL082CP (TI)
uPC4082C (NEC)
OPERATIONAL AMPLIFIER
(J FET-INPUT)
— TOP VIEW —



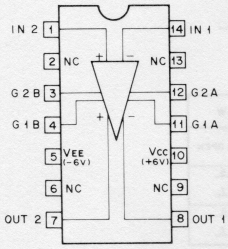
TL084CN (TI)
OPERATIONAL AMPLIFIER
(J FET-INPUT)
— TOP VIEW —



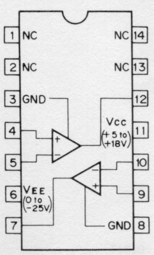
TL592P (TI)
DIFFERENTIAL VIDEO AMPLIFIER
— TOP VIEW —



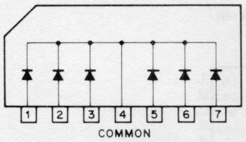
uA733CN (TI)
DIFFERENTIAL VIDEO AMP
— TOP VIEW —



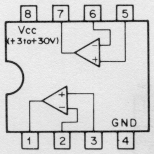
uPC319C (NEC)
DUAL VOLTAGE COMPARATOR
— TOP VIEW —



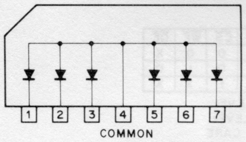
uPA54H (NEC)
DIODE ARRAY
— SIDE VIEW —



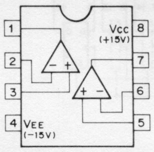
uPC358C (NEC)
DUAL OPERATIONAL AMPLIFIERS
— TOP VIEW —



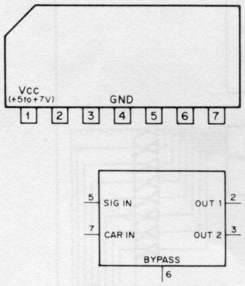
uPA64H (NEC)
DIODE ARRAY
— SIDE VIEW —



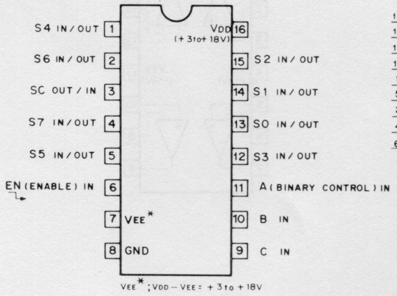
uPC4557C (NEC)
OPERATIONAL AMPLIFIER (WIDE BAND, LOW NOISE)
— TOP VIEW —

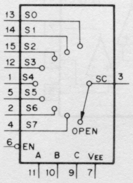


uPC1037H (NEC)
DOUBLE-BALANCED MODULATOR
— SIDE VIEW —



uPD4051BC (NEC)
C-MOS 8-CHANNEL MULTIPLEXER/DEMULTIPLEXER
— TOP VIEW —





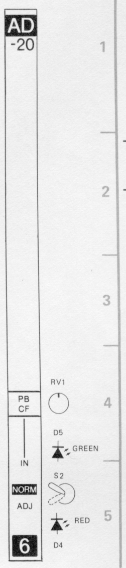
EN	C	B	A	"ON" CHANNEL
0	0	0	0	0
0	0	0	1	1
0	0	1	0	2
0	0	1	1	3
0	1	0	0	4
0	1	0	1	5
0	1	1	0	6
0	1	1	1	7
1	X	X	X	OPEN

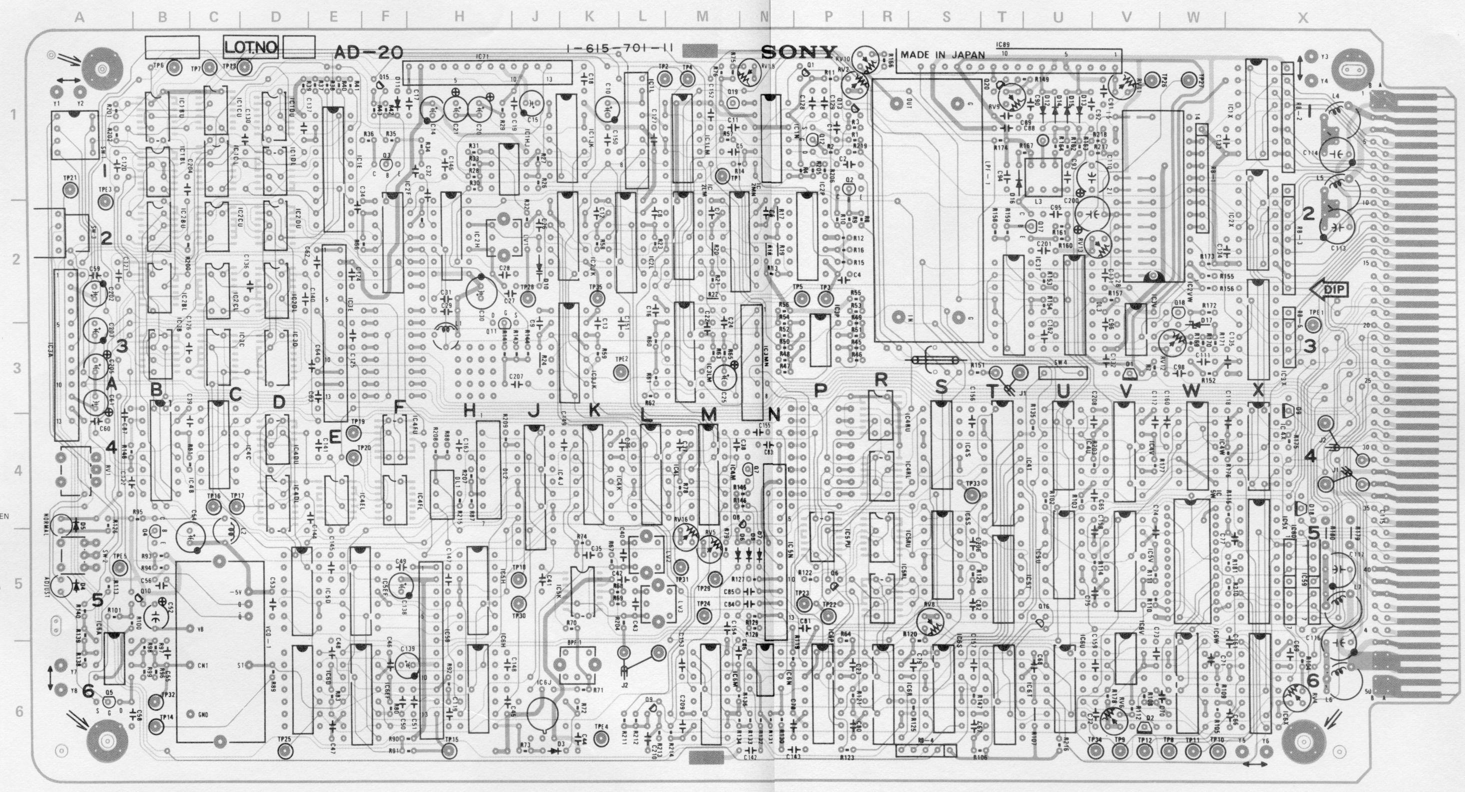
0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE

SECTION C
SCHEMATIC DIAGRAMS & BOARD LAYOUTS

AD-20 BOARD (1-615-701-11)

Component Side

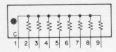




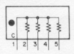
■ 1-615-701-11 COMPONENT SIDE

■ 1-615-701-11 SOLDER SIDE

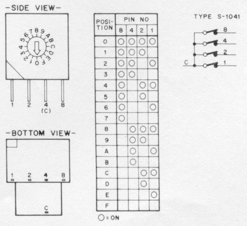
RB1, 2, 3



RB4, 5



S3



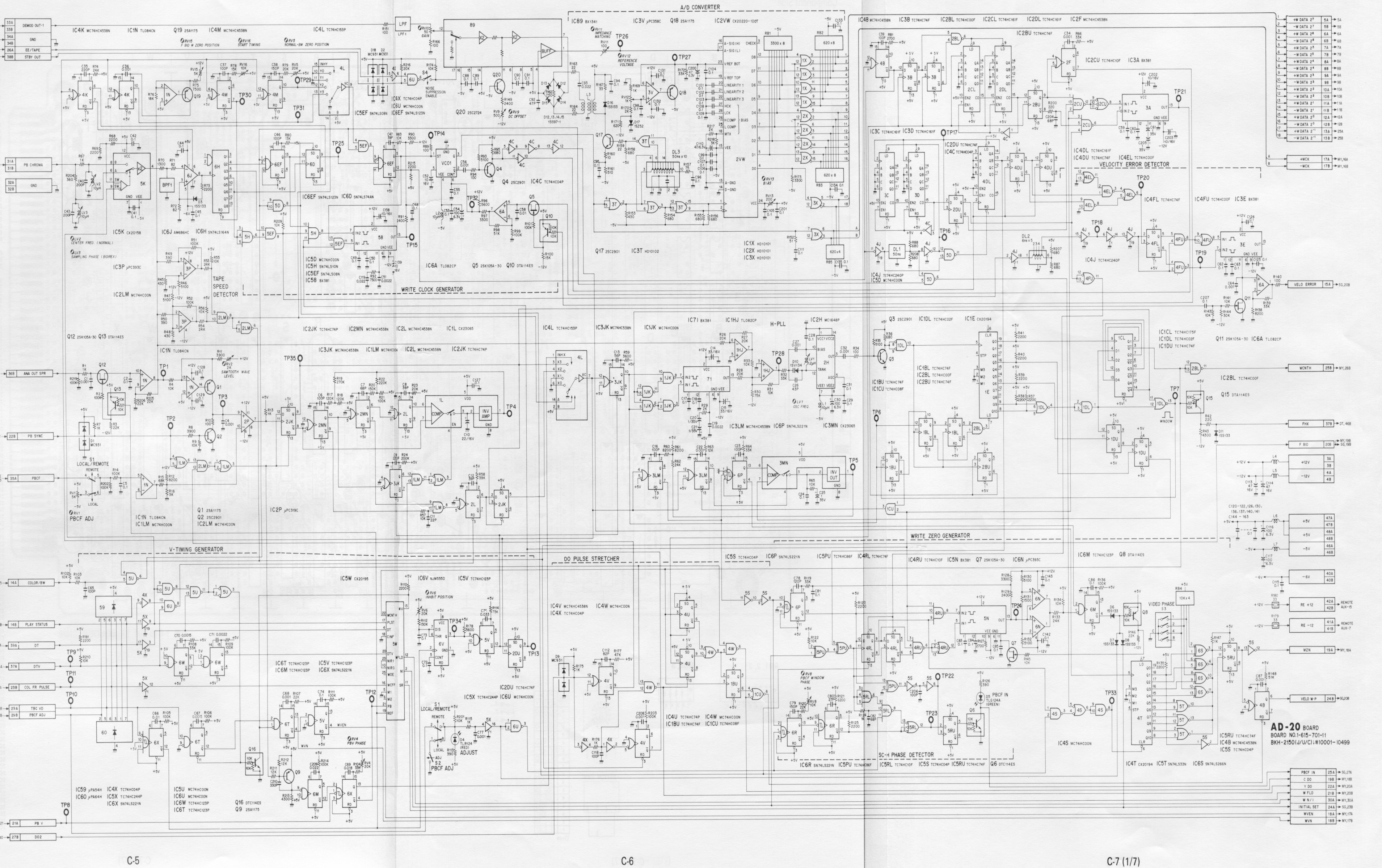
AD-20 (1-615-701-11)

BKH-2150(J,U/C)

BPF1	6K
D1	3V
D2	6V
D3	6J
D4	5A
D5	4A
D6	5N
D7	5N
D8	5N
D9	3X
D10	2J
D11	1F
D12	1U
D13	1U
D14	1U
D15	1U
D16	1T
D17	3W
D18	4X
DL1	4H
DL2	4H
DL3	3U
IC58	6H
IC59	5X
IC60	5X
IC71	1H
IC89	1T
IC1BL	
IC1BU	
IC1CL	
IC1CU	
IC1DL	
IC1DU	
IC1E	
IC1HJ	
IC1JK	
IC1L	
IC1LM	
IC1N	
IC1X	
IC2BL	
IC2BU	
IC2CL	
IC2CU	
IC2DL	
IC2DU	
IC2F	
IC2H	
IC2JK	
IC2L	
IC2LM	
IC2MN	
IC2P	
IC2VW	
IC3A	
IC3B	
IC3C	
IC3D	
IC3E	
IC3JK	
IC3LM	
IC3MN	
IC3P	
IC3T	
IC3V	
IC3X	
IC4B	
IC4C	
IC4DL	
IC4DU	
IC4EL	
IC4FL	
IC4FU	
IC4J	
IC4K	
IC4L	
IC4M	
IC4RL	
IC4RU	
IC4S	
IC4T	
IC4U	
IC4V	
IC4W	
IC4X	
IC5D	
IC5EF	
IC5H	
IC5K	
IC5N	
IC5PU	
IC5RL	
IC5RU	
IC5S	
IC5T	
IC5U	
IC5V	
IC5W	
IC5X	
IC6A	
IC6D	
IC6EF	
IC6F	
IC6H	
IC6J	
IC6M	
IC6N	
IC6P	
IC6R	
IC6S	
IC6T	
IC6U	
IC6V	
IC6W	
IC6X	
LPF	1S
LV1	2H
LV2	5L
LV3	5L
Q1	1P
Q2	1P
Q3	1F
Q4	4B
Q5	6A
Q6	5P
Q7	4N
Q8	4N
Q9	6L
Q10	5B
Q11	3H
Q12	1P
Q13	1P
Q15	1F
Q16	5U
Q17	2U
Q18	3W
Q19	1M
Q20	1T
RB1	1W
RB2	1X
RB3	2X
RB4	6S
RB5	3X
RV1	4A
RV2	1P
RV4	6X
RV5	5M
RV6	6V
RV8	5S
RV9	1T
RV10	1P
RV11	1V
RV12	3W
RV13	2V
RV15	1N
RV16	5M
S1	1A
S2	5A
S3	2A
S4	3U
TP1	1M
TP2	1L
TP3	2P
TP4	1M
TP5	2P
TP6	1B
TP7	1C
TP8	6W
TP9	6V
TP10	6W
TP11	6W
TP12	6V
TP13	1D
TP14	6B
TP15	6H
TP16	4C
TP17	4C
TP18	5J
TP19	4E
TP20	4E
TP21	1A
TP22	5P
TP23	5P
TP24	5M
TP25	6D
TP26	1V
TP27	1W
TP28	2J
TP29	5M
TP30	5J
TP31	5M
TP32	6B
TP33	4S
TP34	6U
TP35	2K
TPE1	3X
TPE2	3L
TPE3	2A
TPE4	6K
TPE5	5A
VCO1	5C

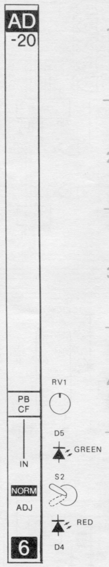
AD-20 BOARD

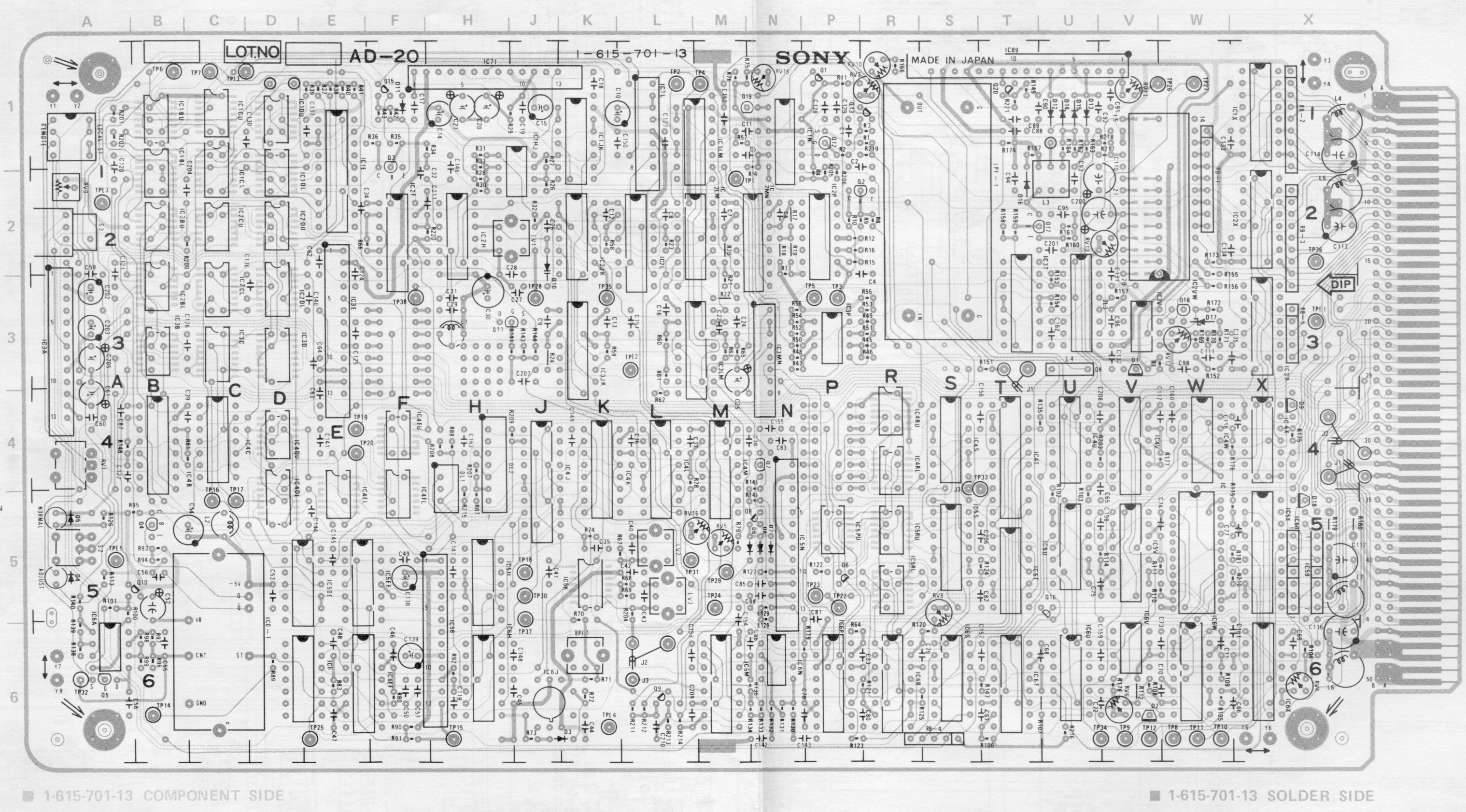
A/D Converter
Write Clock Generator

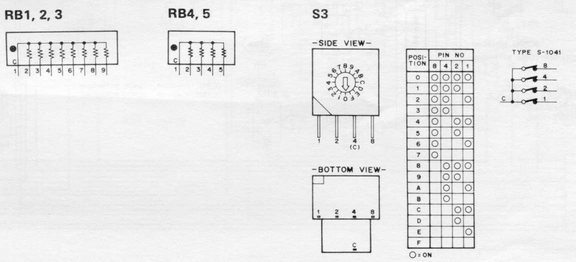


AD-20 BOARD (1-615-701-13)

Component Side







AD-20 (1-615-701-12 & UP)

BKH-2150(J,U/C)

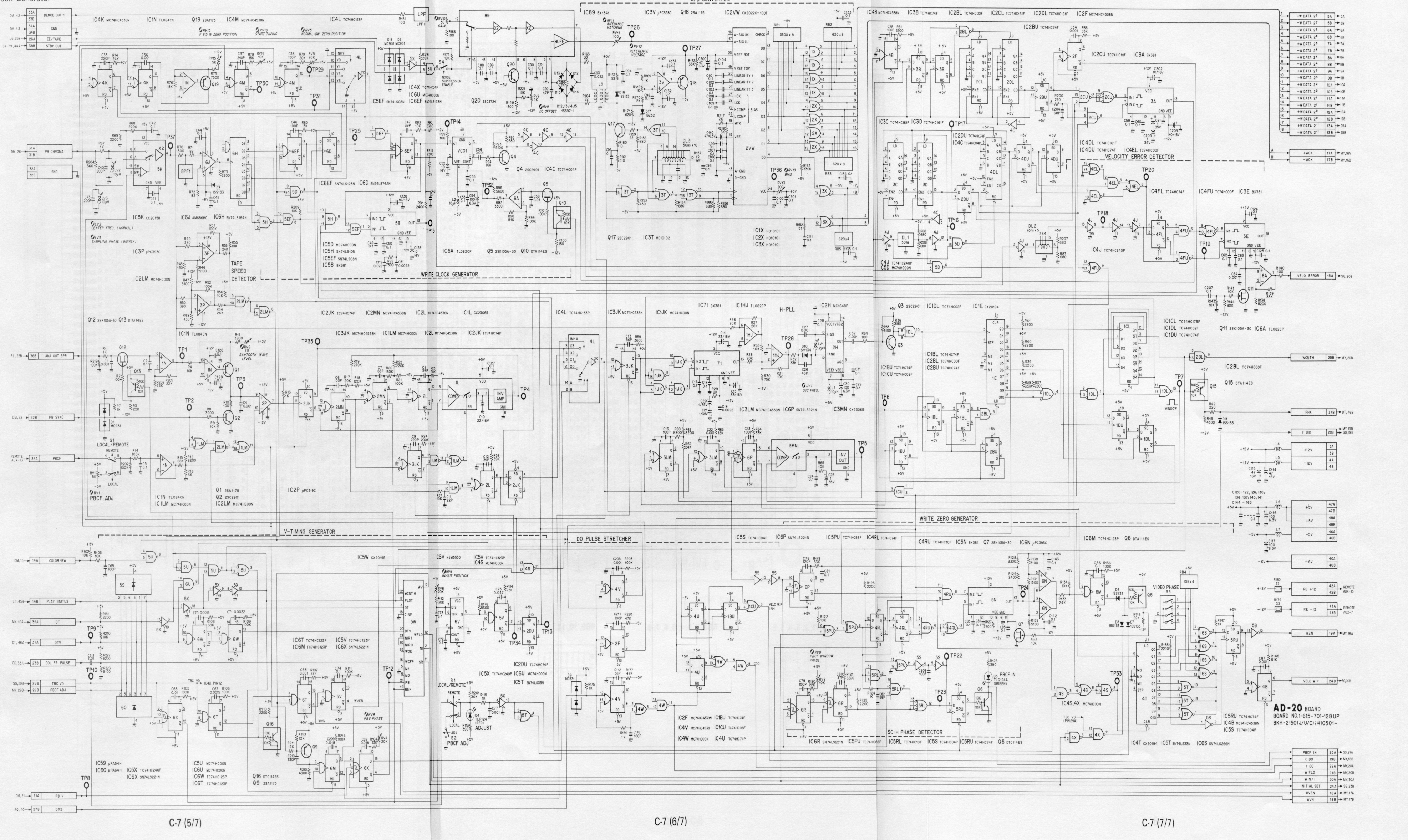
BPF1	6K
D1	3V
D2	6V
D3	6J
D4	5A
D5	5A
D6	5N
D7	5N
D8	5N
D9	4X
D10	2J
D11	1F
D12	1U
D13	1U
D14	1U
D15	1U
D16	2T
D17	3W
D18	5X
DL1	4H
DL2	4H
DL3	3U
IC58	6H
IC59	5X
IC60	5X
IC71	1H
IC89	1T
IC1BL	
IC1BU	
IC1CL	
IC1CU	
IC1DL	
IC1DU	
IC1E	
IC1HJ	
IC1JK	
IC1L	
IC1LM	
IC1N	
IC1X	
IC2BL	
IC2BU	
IC2CL	
IC2CU	
IC2DL	
IC2DU	
IC2F	
IC2H	
IC2JK	
IC2L	
IC2LM	
IC2MN	
IC2P	
IC2VW	
IC3A	
IC3B	
IC3C	
IC3D	
IC3E	
IC3JK	
IC3LM	
IC3MN	
IC3P	
IC3T	
IC3V	
IC3X	
IC4B	
IC4C	
IC4DL	
IC4DU	
IC4EL	
IC4FL	
IC4FU	
IC4J	
IC4K	
IC4L	
IC4M	
IC4RL	
IC4RU	
IC4S	
IC4T	
IC4U	
IC4V	
IC4W	
IC4X	
IC5D	
IC5EF	
IC5H	
IC5K	
IC5N	
IC5PU	
IC5RL	
IC5RU	
IC5S	
IC5T	
IC5U	
IC5V	
IC5W	
IC5X	
IC6A	
IC6D	
IC6EF	
IC6F	

IC6H	
IC6J	
IC6M	
IC6N	
IC6P	
IC6R	
IC6S	
IC6T	
IC6U	
IC6V	
IC6W	
IC6X	
LPF	1S
LV1	2H
LV2	5L
LV3	5L
Q1	1P
Q2	2P
Q3	1F
Q4	5B
Q5	6A
Q6	5P
Q7	4N
Q8	5N
Q9	6L
Q10	5B
Q11	3H
Q12	1P
Q13	1P
Q15	1F
Q16	5U
Q17	2U
Q18	3W
Q19	1M
Q20	1T
RB1	1W
RB2	1X
RB3	2X
RB4	6S
RB5	3X
RV1	4A
RV2	1P
RV4	6X
RV5	5M
RV6	6V
RV8	5S
RV9	1T
RV10	1P
RV11	1V
RV12	3W
RV13	2V
RV15	1N
RV16	5M
S1	1A
S2	5A
S3	2A
S4	3U
TP1	2M
TP2	1L
TP3	3P
TP4	1M
TP5	3P
TP6	1B
TP7	1C
TP8	6W
TP9	6V
TP10	6W
TP12	6V
TP13	1D
TP14	6B
TP15	6H
TP16	5C
TP17	5C
TP18	5J
TP19	4E
TP20	4E
TP22	5P
TP23	5P
TP24	5M
TP25	6E
TP26	1V
TP27	1W
TP28	3J
TP29	5M
TP30	5J
TP31	5M
TP32	6B
TP33	4S
TP34	6U
TP35	2K
TP36	2X
TP37	5J
TPE1	3X
TPE2	3L
TPE3	2A
TPE4	6K
TPE5	5A
VCO1	5C

AD-20 BOARD

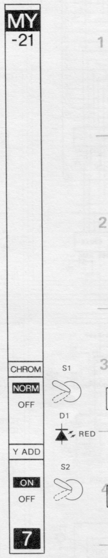
A/D Converter

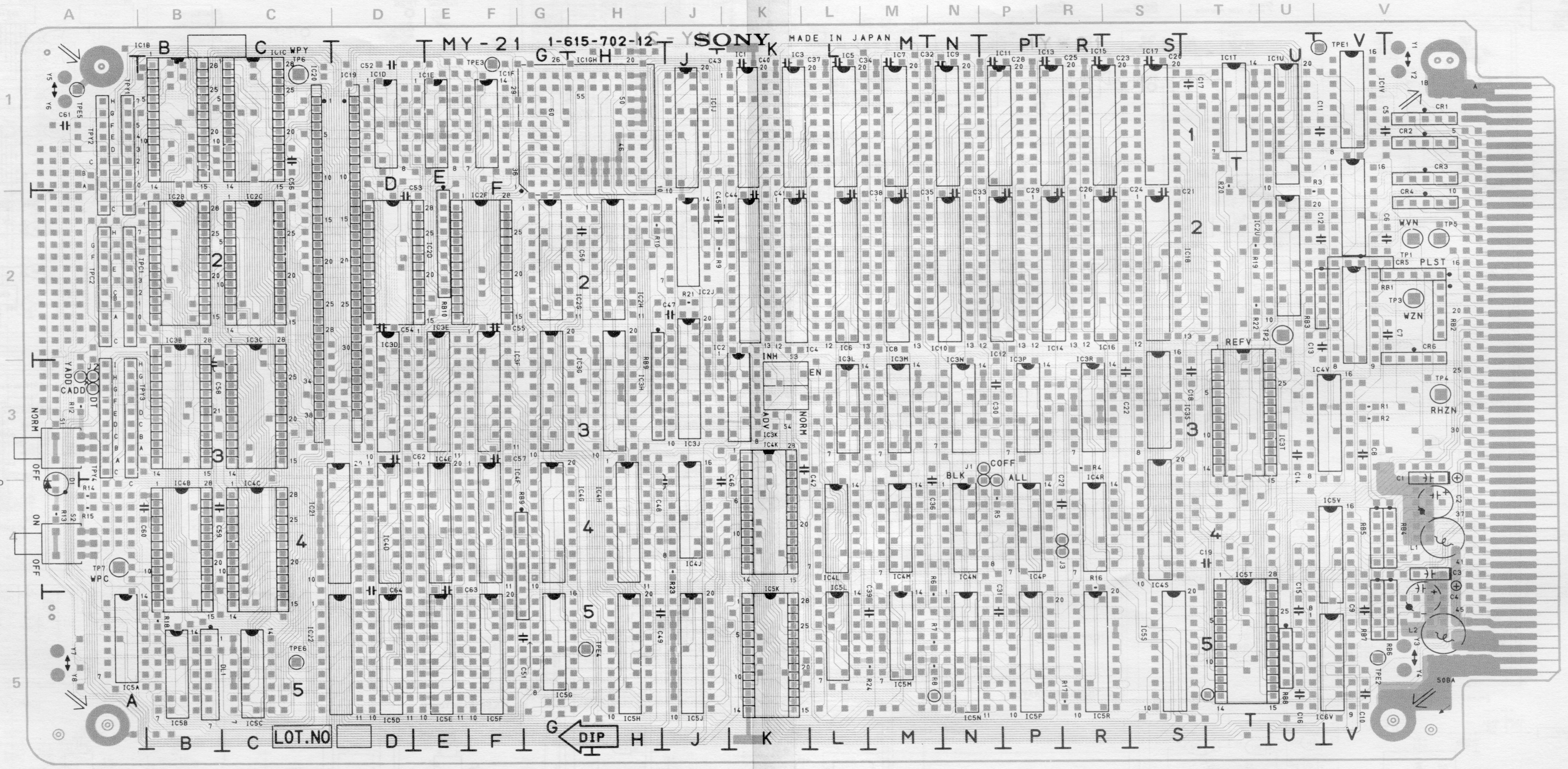
Write Clock Generator



MY-21 BOARD (1-615-702-12)

Component Side

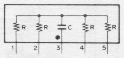




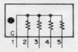
■ 1-615-702-12 COMPONENT SIDE

■ 1-615-702-12 SOLDER SIDE

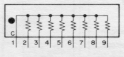
CR1, 2, 3, 4, 5, 6



RB1, 2, 3, 4, 5, 6, 7, 8



RB9, 10, 11



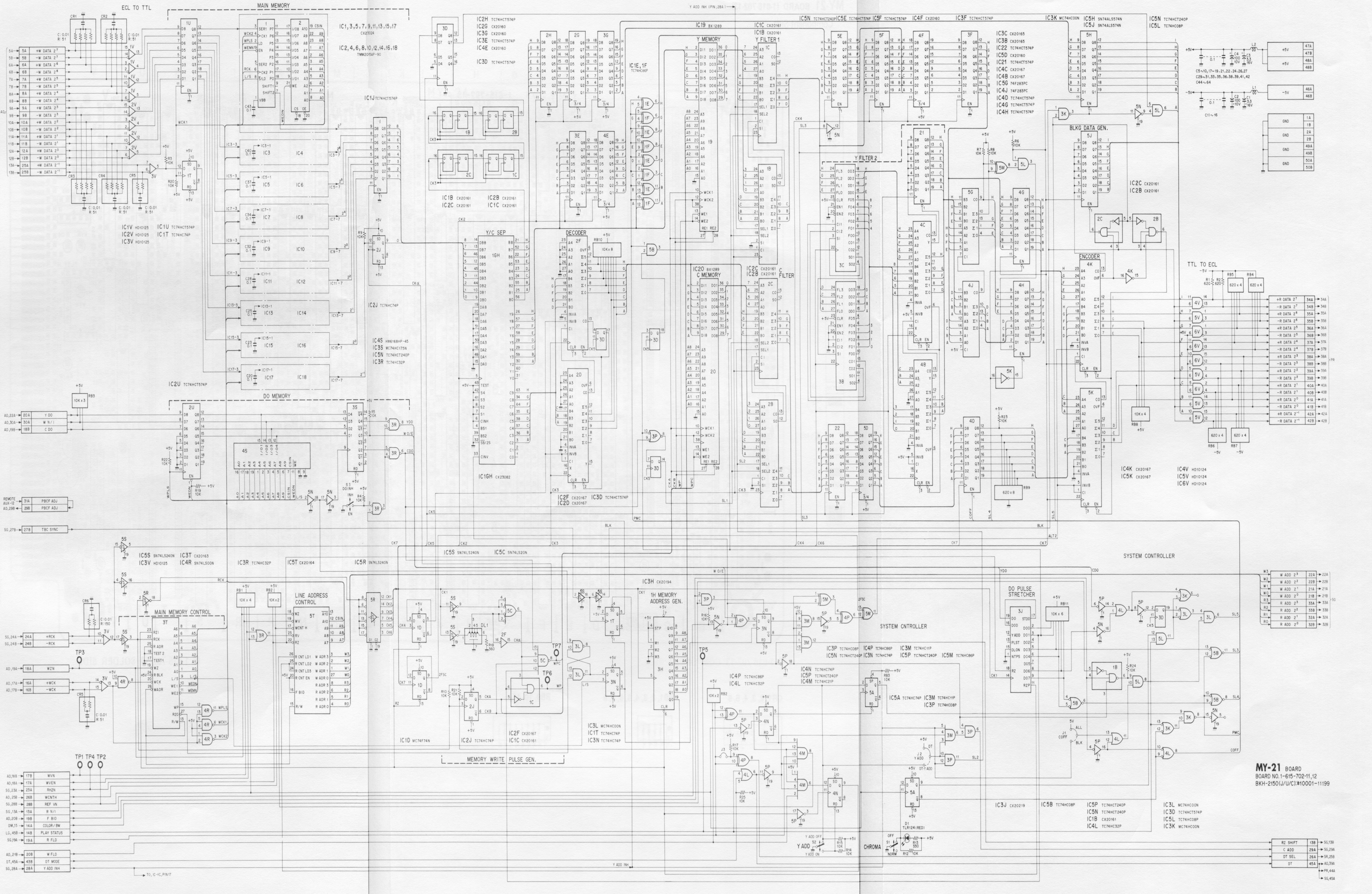
MY-21 (1-615-702-12

BKH-2150(J,U/C)

CR1	1V	IC4B	
CR2	1V	IC4C	
CR3	1V	IC4D	
CR4	2V	IC4E	
CR5	2V	IC4F	
CR6	3V	IC4G	
		IC4H	
D1	4A	IC4J	
		IC4K	
DL1	5B	IC4L	
		IC4M	
IC1	1K	IC4N	
IC2	3K	IC4P	
IC3	1K	IC4R	
IC4	2K	IC4S	
IC5	1L	IC4V	
IC6	2L	IC5A	
IC7	1M	IC5B	
IC8	2M	IC5C	
IC9	1N	IC5D	
IC10	2N	IC5E	
IC11	1P	IC5F	
IC12	2P	IC5G	
IC13	1P	IC5H	
IC14	2P	IC5J	
IC15	1R	IC5K	
IC16	2R	IC5L	
IC17	1S	IC5M	
IC18	2S	IC5N	
IC19	2D	IC5P	
IC20	2C	IC5R	
IC21	4D	IC5S	
IC22	5D	IC5T	
		IC5V	
IC1B		IC6V	
IC1C			
IC1D		RB1	2V
IC1E		RB2	2V
IC1F		RB3	2V
IC1GH		RB4	4V
IC1J		RB5	4V
IC1T		RB6	5V
IC1U		RB7	5V
IC1V		RB8	5U
IC2B		RB9	4G
IC2C		RB10	2E
IC2D		RB11	3H
IC2F			
IC2G		S1	3A
IC2H		S2	4A
IC2J		S3	3K
IC2U			
IC2V		TP1	2V
IC3B		TP2	2U
IC3C		TP3	2V
IC3D		TP4	3V
IC3E		TP5	2V
IC3F		TP6	1C
IC3G		TP7	4A
IC3H			
IC3J		TPE1	1V
IC3K		TPE2	5V
IC3L		TPE3	1F
IC3M		TPE4	5G
IC3N		TPE5	1A
IC3P		TPE6	5C
IC3R			
IC3S			
IC3T			
IC3V			

MY-21 BOARD

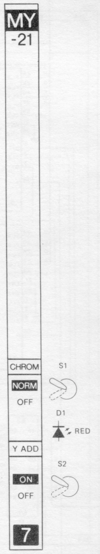
16-Line Memory
Dropout Compensator
Sequencer

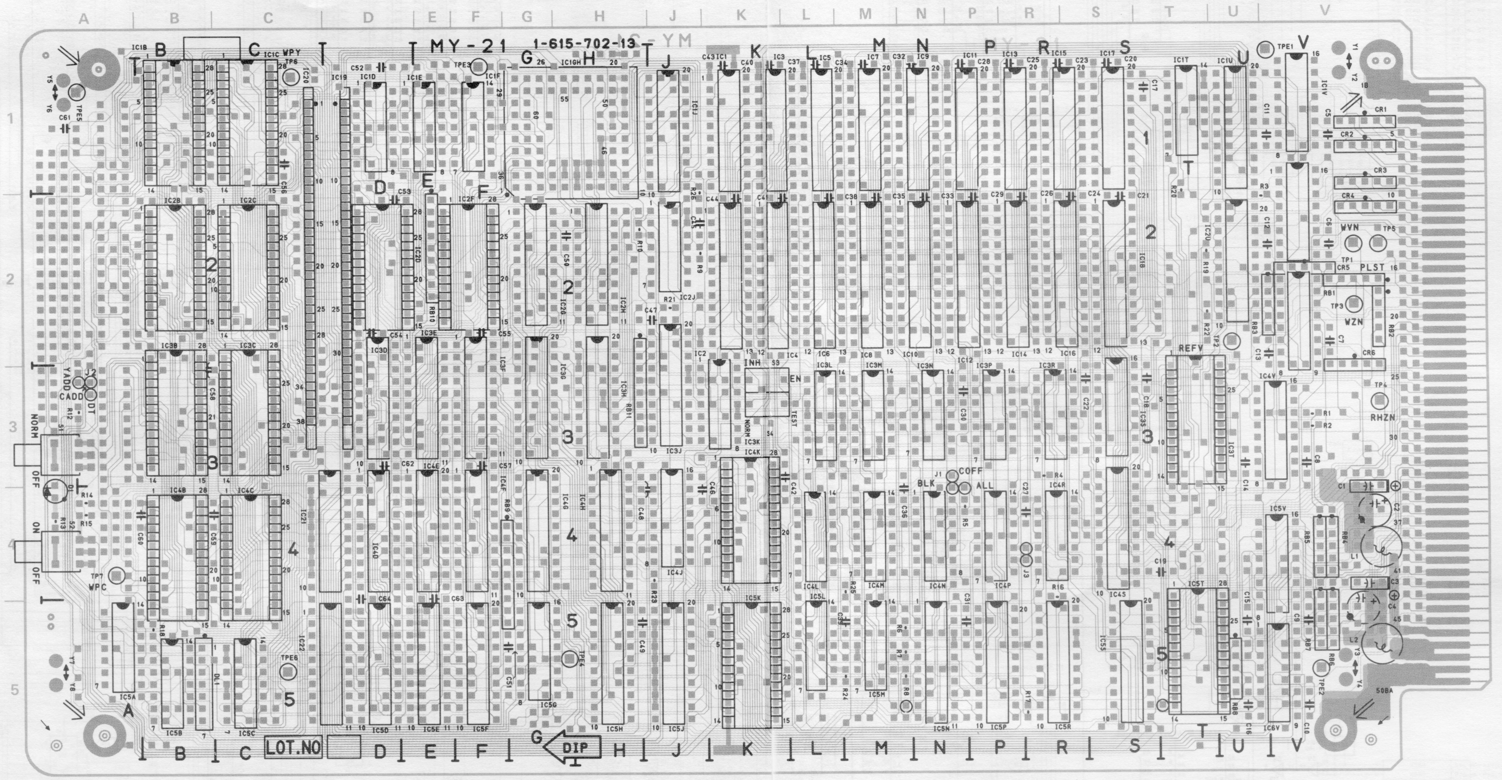


MY-21 BOARD
BOARD NO.1-615-702-11,12
BKH-2150(J/U/C)#10001~11199

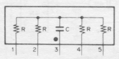
MY-21 BOARD (1-615-702-13)

Component Side

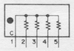




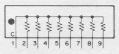
CR1, 2, 3, 4, 5, 6



RB1, 2, 3, 4, 5, 6, 7, 8



RB9, 10, 11



MY-21 (1-615-702-13 & UP)

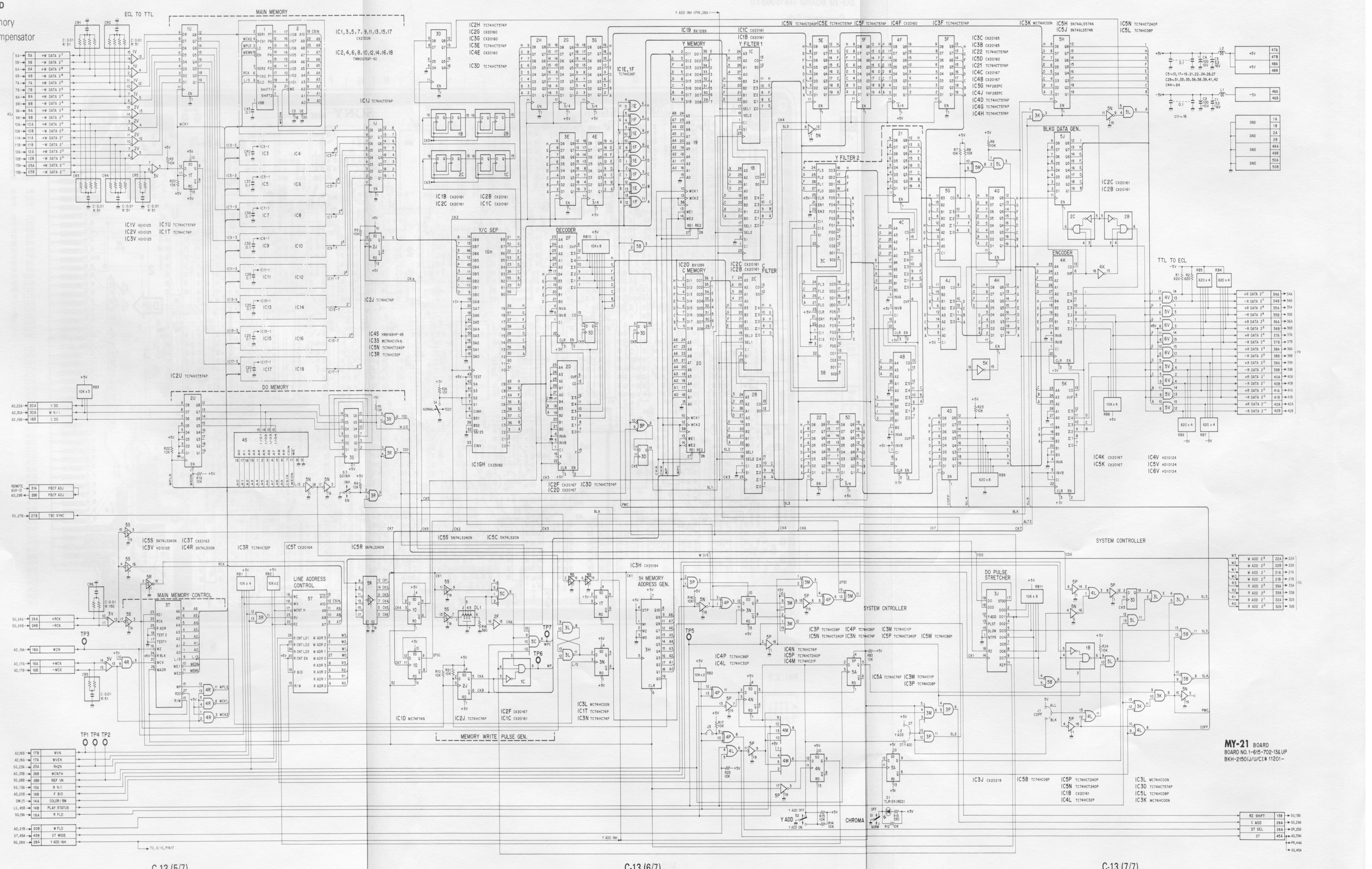
BKH-2150(J,U/C)

CR1	1V
CR2	1V
CR3	1V
CR4	2V
CR5	2V
CR6	3V
D1	4A
DL1	5B
IC1	1K
IC2	3K
IC3	1K
IC4	2K
IC5	1L
IC6	2L
IC7	1M
IC8	2M
IC9	1N
IC10	2N
IC11	1P
IC12	2P
IC13	1P
IC14	2P
IC15	1R
IC16	2R
IC17	1S
IC18	2S
IC19	2D
IC20	2C
IC21	4D
IC22	5D
IC1B	
IC1C	
IC1D	
IC1E	
IC1F	
IC1GH	
IC1J	
IC1T	
IC1U	
IC1V	
IC2B	
IC2C	
IC2D	
IC2F	
IC2G	
IC2H	
IC2J	
IC2U	
IC2V	
IC3B	
IC3C	
IC3D	
IC3E	
IC3F	
IC3G	
IC3H	
IC3J	
IC3K	
IC3L	
IC3M	
IC3N	
IC3P	
IC3R	
IC3S	
IC3T	
IC3V	

IC4B	
IC4C	
IC4D	
IC4E	
IC4F	
IC4G	
IC4H	
IC4J	
IC4K	
IC4L	
IC4M	
IC4N	
IC4P	
IC4R	
IC4S	
IC4V	
IC5A	
IC5B	
IC5C	
IC5D	
IC5E	
IC5F	
IC5G	
IC5H	
IC5J	
IC5K	
IC5L	
IC5M	
IC5N	
IC5P	
IC5R	
IC5S	
IC5T	
IC5V	
IC6V	
RB1	2V
RB2	2V
RB3	2V
RB4	4V
RB5	4V
RB6	5V
RB7	5V
RB8	5U
RB9	4G
RB10	2E
RB11	3H
S1	3A
S2	4A
S3	3K
S4	3K
TP1	2V
TP2	2U
TP3	2V
TP4	3V
TP5	2V
TP6	1C
TP7	4A
TPE1	1V
TPE2	5V
TPE3	1F
TPE4	5G
TPE5	1A
TPE6	5C

MY-21 BOARD

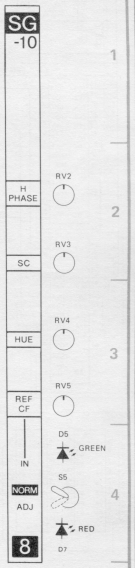
16-Line Memory
Dropout Compensator
Sequencer

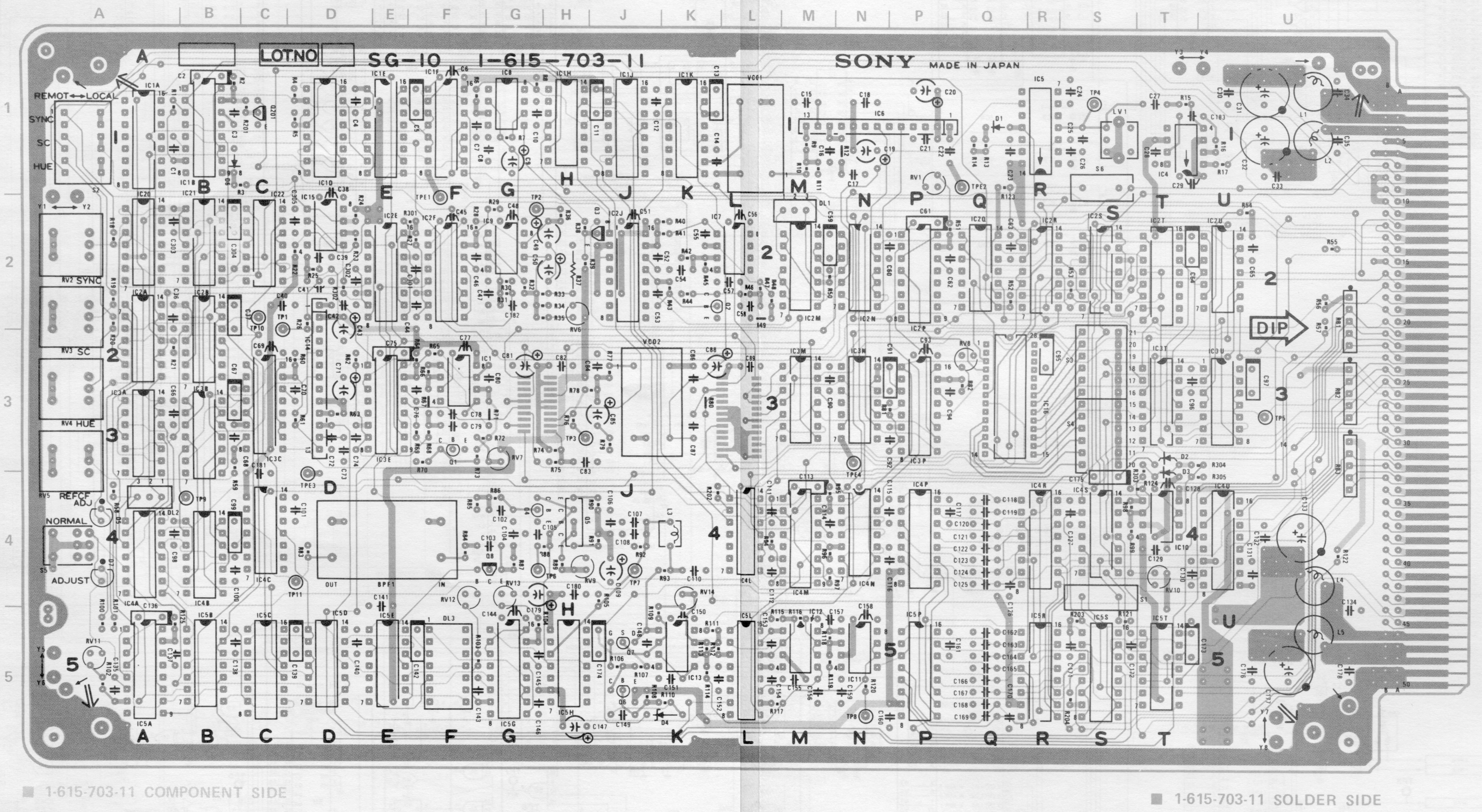


C-13 (5/7) C-13 (6/7) C-13 (7/7)

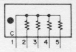
SG-10 BOARD (1-615-703-11)

Component Side





RB1, 2, 3

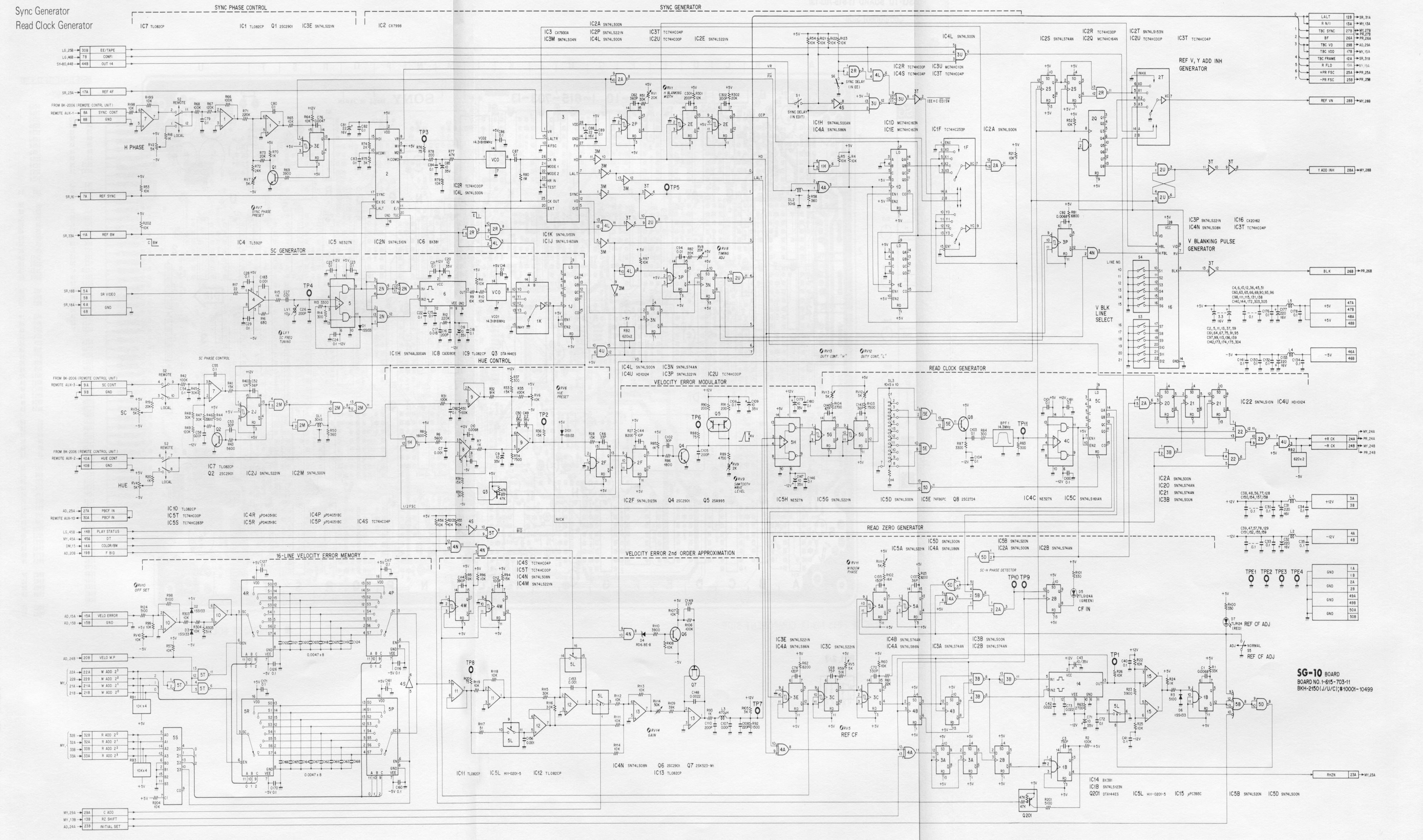


SG-10 (1-615-703-11)

BKH-2150(J,U/C)

BPF1	5E
D1	1Q
D2	3T
D3	3T
D4	5K
D5	4A
D6	1B
D7	4A
D101	2G
DL1	2M
DL2	4A
DL3	5F
IC1	3F
IC2	3G
IC3	3L
IC4	1T
IC5	1R
IC6	1N
IC7	2L
IC8	1G
IC9	2G
IC10	4T
IC11	5N
IC12	5M
IC13	5K
IC14	3D
IC15	2D
IC16	3Q
IC20	2A
IC21	2B
IC22	2C
IC1B	
IC1D	
IC1E	
IC1F	
IC1H	
IC1J	
IC1K	
IC2A	
IC2B	
IC2E	
IC2F	
IC2J	
IC2M	
IC2N	
IC2P	
IC2Q	
IC2R	
IC2S	
IC2T	
IC2U	
IC3A	
IC3B	
IC3C	
IC3E	
IC3M	
IC3N	
IC3P	
IC3T	
IC3U	
IC4A	
IC4B	
IC4C	
IC4L	
IC4M	
IC4N	
IC4P	
IC4R	
IC4S	
IC4U	
IC5A	
IC5B	
IC5C	
IC5D	
IC5E	
IC5G	
IC5H	
IC5L	
IC5P	
IC5R	
IC5S	
IC5T	
LV1	1S
Q1	3F
Q2	2K
Q3	2J
Q4	4G
Q5	4H
Q6	5J
Q7	5J
Q8	4G
Q201	1C
RB1	2U
RB2	3U
RB3	3U
RV1	1P
RV2	2A
RV3	2A
RV4	3A
RV5	3A
RV6	2H
RV7	3G
RV8	3Q
RV9	4H
RV10	4T
RV11	5A
RV12	4F
RV13	4G
RV14	4K
S1	4S
S2	1A
S3	3S
S4	3S
S5	4A
S6	1S
TP1	2C
TP2	2G
TP3	3H
TP4	1S
TP5	3U
TP6	4G
TP7	4J
TP8	5N
TP9	4B
TP10	2C
TP11	4D
TPE1	2F
TPE2	1Q
TPE3	3D
TPE4	3N
VCO1	1L
VCO2	3J

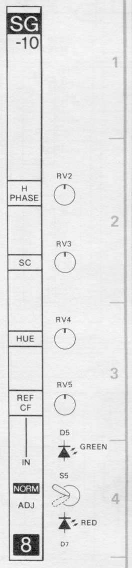
SG-10 BOARD
Sync Generator
Read Clock Generator

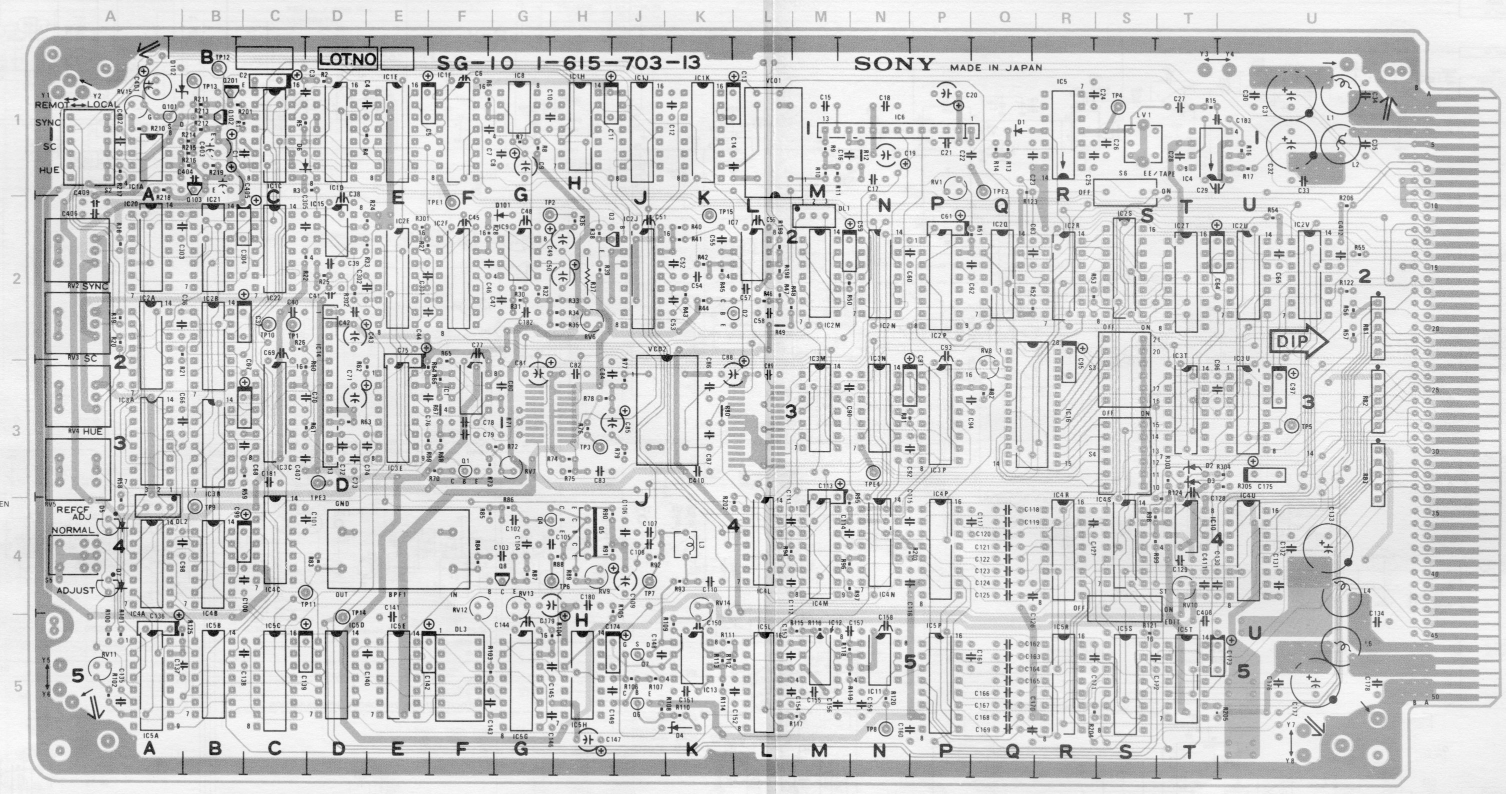


SG-10 BOARD
BOARD NO. 1-615-703-11
BKH-2150(J/U/C);#10001–10499

SG-10 BOARD (1-615-703-13)

Component Side

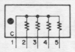




■ 1-615-703-13 COMPONENT SIDE

■ 1-615-703-13 SOLDER SIDE

RB1, 2, 3



SG-10 (1-615-703-12 & UP)

BKH-2150(J,U/C)

BPF1 4E

D1 1Q
D2 3T
D3 3T
D4 5K
D5 4A
D6 1B
D7 4A
D101 2G
D102 1B

DL1 2M
DL2 4A
DL3 5F

IC1 3F
IC2 3G
IC3 3L
IC4 1T
IC5 1R
IC6 1N
IC7 2L
IC8 1G
IC9 2G
IC10 4T
IC11 5N
IC12 5M
IC13 5K
IC14 3D
IC15 2D
IC16 3Q
IC20 2A
IC21 2B
IC22 2C

IC1A
IC1C
IC1D
IC1E
IC1F
IC1H
IC1J
IC1K
IC2A
IC2B
IC2E
IC2F
IC2J
IC2M
IC2N
IC2P
IC2Q
IC2R
IC2S
IC2T
IC2U
IC3A
IC3B
IC3C
IC3E
IC3M
IC3N
IC3P
IC3T
IC3U
IC4A
IC4B
IC4C
IC4L
IC4M
IC4N
IC4P
IC4R
IC4S
IC4U
IC5A
IC5B
IC5C
IC5D
IC5E
IC5G
IC5H
IC5L
IC5P
IC5R
IC5S
IC5T

LV1 1S

Q1 3F
Q2 2K
Q3 2J
Q4 4G
Q5 4H
Q6 5J
Q7 5J
Q8 4G
Q101 1B
Q102 1B
Q103 1B
Q201 1C

RB1 2U
RB2 3U
RB3 3U

RV1 1P
RV2 2A
RV3 2A
RV4 3A
RV5 3A
RV6 2H
RV7 3G
RV8 3Q
RV9 4H
RV10 4T
RV11 5A
RV12 4F
RV13 4G
RV14 4K
RV15 1A

S1 4S
S2 1A
S3 3S
S4 3S
S5 4A
S6 1S

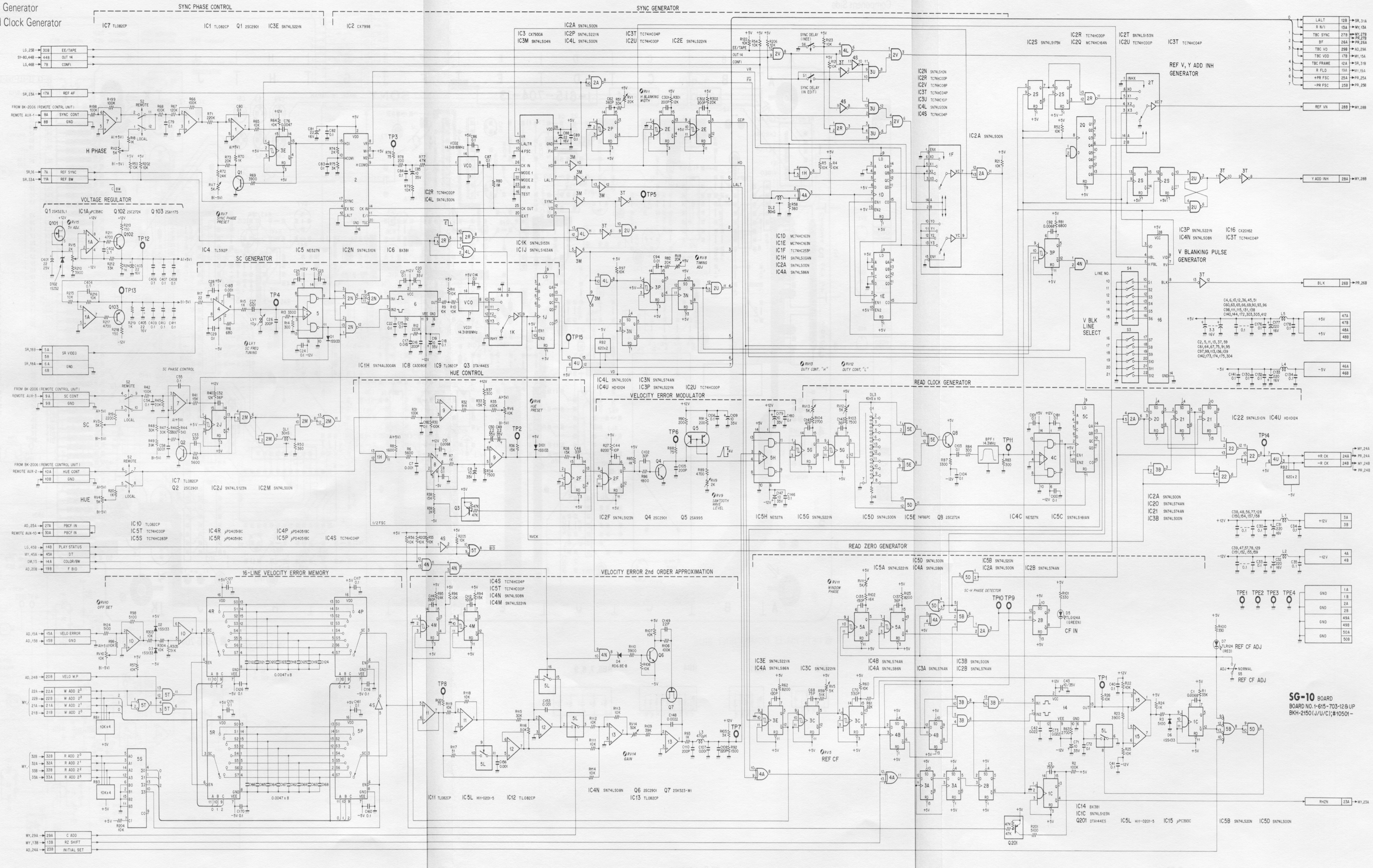
TP1 2C
TP2 2G
TP3 3H
TP4 1S
TP5 3U
TP6 4G
TP7 4J
TP8 5N
TP9 4B
TP10 2C
TP11 4D
TP12 1B
TP13 1B
TP14 5D
TP15 2K

TPE1 2F
TPE2 1Q
TPE3 3D
TPE4 3N

VCO1 1L
VCO2 3J

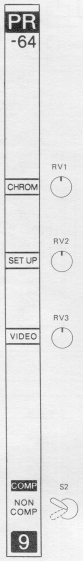
SG-10 BOARD

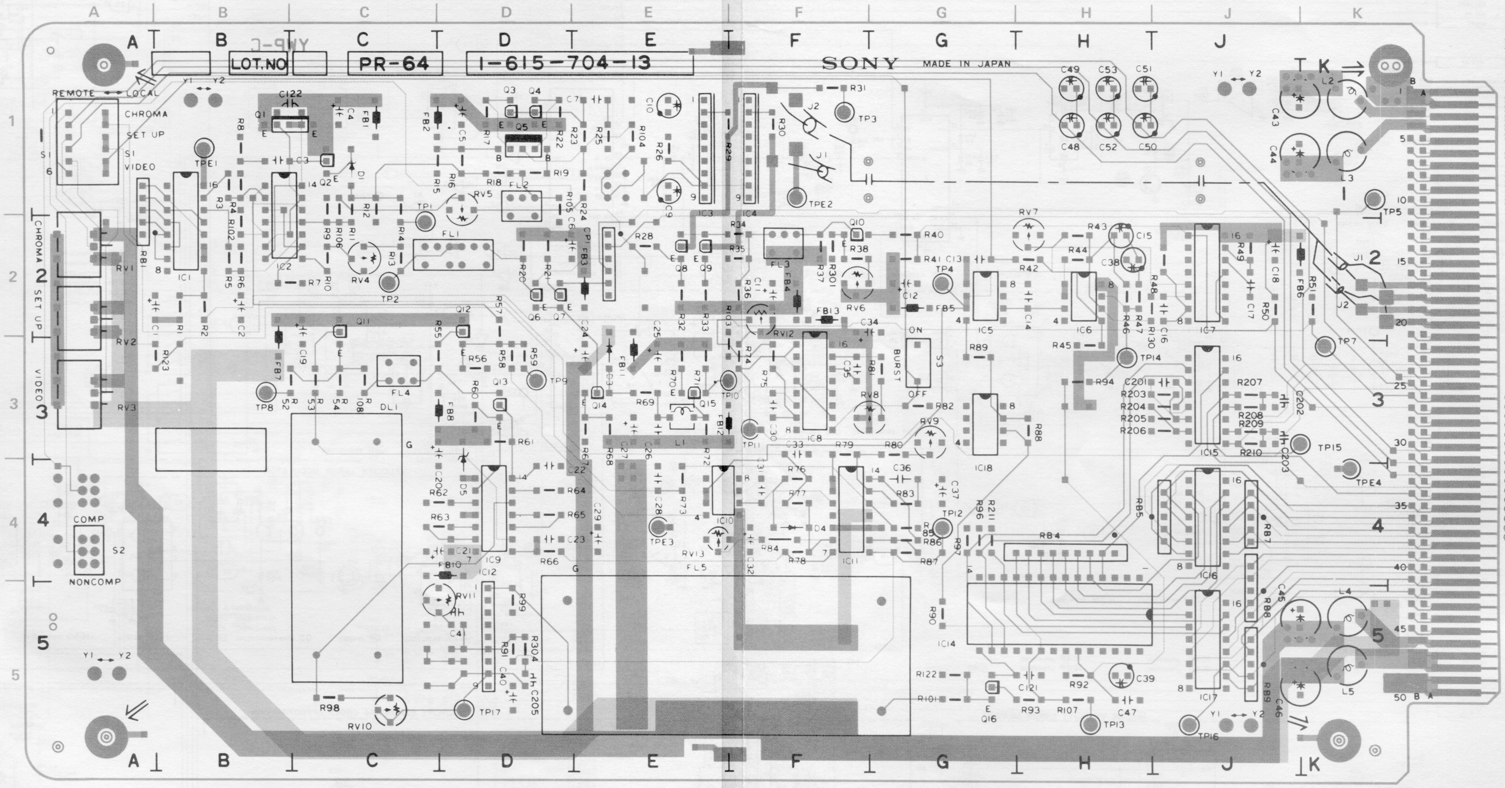
Sync Generator
Read Clock Generator



PR-64 BOARD (1-615-704-13)

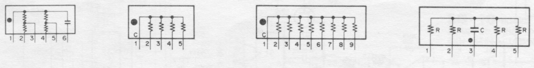
Component Side





■ 1-615-704-13 COMPONENT SIDE

■ 1-615-704-13 SOLDER SIDE

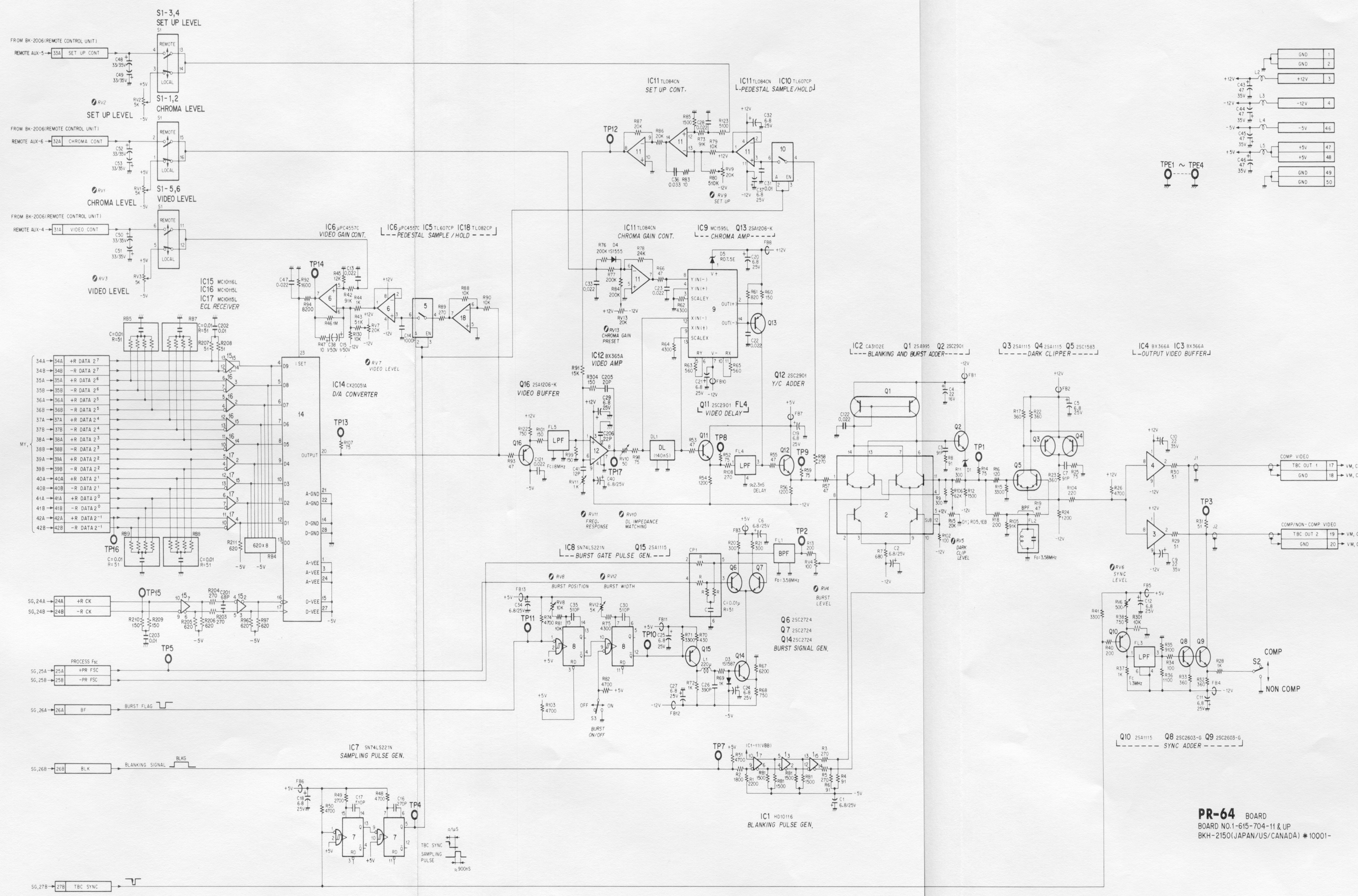


PR-64 (1-615-704-13 & UP)

BKH-2150(J,U/C)

CP1	2E	RB1	2A
		RB4	4H
D1	1C	RB5	4J
D3	3E	RB7	4J
D4	4F	RB8	5J
D5	4D	RB9	5J
D6	3B		
		RV1	2A
DL1	4C	RV2	2A
		RV3	3A
FL1	2D	RV4	2C
FL2	1D	RV5	1D
FL3	2F	RV6	2F
FL4	3C	RV7	2H
FL5	5E	RV8	3F
		RV9	3G
IC1	2B	RV10	5C
IC2	2B	RV11	5D
IC3	1E	RV12	2F
IC4	1F	RV13	4E
IC5	2G		
IC6	2H	S1	1A
IC7	2J	S2	4A
IC8	3F	S3	3G
IC9	4D		
IC10	4E	TP1	2C
IC11	4F	TP2	2C
IC12	5D	TP3	1F
IC14	5H	TP4	2G
IC15	3J	TP5	1K
IC16	4J	TP7	3K
IC17	5J	TP8	3B
IC18	3G	TP9	3D
		TP10	3E
Q1	1C	TP11	3F
Q2	1C	TP12	4G
Q3	1D	TP13	5H
Q4	1D	TP14	3H
Q5	1D	TP15	3J
Q6	2D	TP16	5J
Q7	2D	TP17	5D
Q8	2E		
Q9	2E	TPE1	1B
Q10	2F	TPE2	1F
Q11	2C	TPE3	4E
Q12	2D	TPE4	4K
Q13	3D		
Q14	3E		
Q15	3E		
Q16	5G		

PR-64 BOARD
D/A Converter
Processor



SECTION D
REPLACEABLE PARTS

補修用部品注意事項

(1) 部品の共通化

ソニーから供給される部品はセットに実装されているものと異なることがある。これは部品の共通化，改良等によるものである。

電気部品表には現時点での共通化された部品が記載されている。

(2) 部品の変更

部品の変更に関する情報は第E章「CHANGED PARTS」を参照のこと。

(3) 部品の在庫

部品表中，( )で示されている部品は交換頻度が低い部品であるので在庫していないことがあり，納期が長くなることがある。

(4) コンデンサー，インダクター，抵抗の単位

回路図，電気部品表中，特に明記したものを除き，下記の単位は省略されている。

コンデンサー；μF
インダクター；μH
抵抗；Ω

Notes on Repair Parts

(1) Standardization of Parts

Repair parts supplied from Sony Parts Center may not be always identical with the parts which actually in use due to "accommodating the improved parts and/or engineering changes" or "standardization of genuine parts".

This manual's electrical spare parts list is indicating the parts numbers of "the standardized genuine parts at present".

(2) Change of Parts

Regarding engineering parts changes, refer to Section E. "CHANGED PARTS".

(3) Stock of Parts

Parts marked with ( ) on the spare parts list are not normally required for routine service work. Orders for parts marked with ( ) will be processed, but allow for additional delivery time.

(4) Units for Capacitors, Inductors and Resistors

The following units are assumed in electrical parts list and schematic diagrams unless otherwise specified:

Capacitors; μF
Inductors; μH
Resistors; ohm

AD-20 BOARD (BKH-2150/CARD RACK)

Ref.No. or Q'ty	Part No.	Description
1pc	() A-6257-141-A	COMPLETE PCB,AD-20
(This assembly includes the following parts.)		
1pc	() X-3673-641-0	PLATE ASSY,SHIELD
C65,118	1-102-106-00	CAP,CERAMIC 100PF 10% 50V
C9,35	1-102-110-00	CAP,CERAMIC 220PF 10% 50V
C210	1-102-112-00	CAP,CERAMIC 330PF 10% 50V
C8,12,47	1-107-075-00	CAP,MICA 39PF 5% 50V
C92	1-107-077-00	CAP,MICA 47PF 5% 50V
C13,112	1-107-079-00	CAP,MICA 56PF 5% 50V
C7,82,204	1-107-081-00	CAP,MICA 68PF 5% 50V
C80	1-107-157-00	CAP,MICA 27PF 5% 500V
C26	1-107-162-00	CAP,MICA 43PF 5% 500V
C11	1-107-210-00	CAP,MICA 22PF 5% 500V
C6,16,23,39,46,206,211	1-109-535-00	CAP,MICA 100PF 5% 100V
C78	1-109-537-00	CAP,MICA 120PF 5% 100V
C38,79	1-109-539-00	CAP,MICA 150PF 5% 100V
C40,43	1-109-541-00	CAP,MICA 200PF 5% 100V
C37	1-109-543-00	CAP,MICA 250PF 5% 100V
C116,117	1-123-307-00	CAP,ELECT 100 20% 6.3V
C14,15	1-123-318-00	CAP,ELECT 33 20% 16V
C113,114	1-123-332-00	CAP,ELECT 47 20% 16V
C30,54	1-124-225-00	CAP,ELECT 100 20% 6.3V
C138,139,202,203	1-124-233-00	CAP,ELECT 10 20% 16V
C10	1-124-234-00	CAP,ELECT 22 20% 16V
C1,4,22,27,32,34,36,56, 64,68,77,87,208	1-130-471-00	CAP,MYLAR 0.001 5% 50V
C67,70	1-130-473-00	CAP,MYLAR 0.0015 5% 50V
C19,51,71	1-130-475-00	CAP,MYLAR 0.0022 5% 50V
C58,66,212	1-130-483-00	CAP,MYLAR 0.01 5% 50V
C209	1-130-486-00	CAP,MYLAR 0.018 5% 50V
C93,119	1-130-487-00	CAP,MYLAR 0.022 5% 50V

(AD-20 BOARD,BKH-2150/CARD RACK)

Ref.No. or Q'ty	Part No.	Description
C75	1-130-491-00	CAP,MYLAR 0.047 5% 50V
C73,85	1-130-495-00	CAP,MYLAR 0.1 5% 50V
C20,21,25,61,205	1-131-347-00	CAP,TANT 1 10% 35V
C52	1-131-371-00	CAP,TANT 10 10% 16V
C110,200	1-131-387-00	CAP,TANT 47 10% 6.3V
C2,5,17,18,24,28,29,31, 41,42,44,45,48,49,50, 53,55,59,60,62,63,72, 74,81,83,84,86,88,89, 90,91,94,95,96,98,111, 120,121,122,124,125, 126,127,128,129,130, 131,132,133,134,135, 136,137,140,141,142, 143,144,145,146,147, 148,149,150,151,152, 153,154,155,156,157, 158,159,160,161,162, 163	1-161-894-00	CAP,CERAMIC 0.1 +80/-20% 50V
C99,101,102,103,104,105, 106,107,108,109	1-163-038-00	CAP,CHIP CERAMIC 0.1 +80/-20% 25V
R160	1-214-509-00	RES,METAL 10 1% 1/8W
R159,163,164	1-214-517-00	RES,METAL 22 1% 1/8W
R167	1-214-521-00	RES,METAL 33 1% 1/8W
R152	1-214-526-00	RES,METAL 51 1% 1/8W
R157	1-214-530-00	RES,METAL 75 1% 1/8W
R71,72	1-214-531-00	RES,METAL 82 1% 1/8W
R10,34,89,94,140,151, 166	1-214-533-00	RES,METAL 100 1% 1/8W

(AD-20 BOARD,BKH-2150/CARD RACK)

Ref.No. or Q'ty	Part No.	Description
R42,200	1-214-541-00	RES,METAL 220 1% 1/8W
R204	1-214-546-00	RES,METAL 360 1% 1/8W
R49,50,113,126	1-214-547-00	RES,METAL 390 1% 1/8W
R45,48,153	1-214-548-00	RES,METAL 430 1% 1/8W
R161	1-214-550-00	RES,METAL 510 1% 1/8W
R171	1-214-552-00	RES,METAL 620 1% 1/8W
R36,87,88,95,154,155, 156,158,207,208	1-214-553-00	RES,METAL 680 1% 1/8W
R162	1-214-554-00	RES,METAL 750 1% 1/8W
R1,7,13,67,115,124,147, 169,175,176	1-214-557-00	RES,METAL FILM 1K 1% 1/8W
R70,149	1-214-560-00	RES,METAL 1.3K 1% 1/8W
R131	1-214-561-00	RES,METAL 1.5K 1% 1/8W
R29,170,217	1-214-564-00	RES,METAL 2K 1% 1/8W
R37,38,39,40,41,68,69, 73,110,123,125,135,181, 215	1-214-565-00	RES,METAL 2.2K 1% 1/8W
R91,129	1-214-566-00	RES,METAL 2.4K 1% 1/8W
R81,127	1-214-567-00	RES,METAL 2.7K 1% 1/8W
R16,218	1-214-568-00	RES,METAL 3K 1% 1/8W
R90,97,128,173	1-214-569-00	RES,METAL 3.3K 1% 1/8W
R59	1-214-570-00	RES,METAL 3.6K 1% 1/8W
R8,11	1-214-571-00	RES,METAL 3.9K 1% 1/8W
R43,213	1-214-572-00	RES,METAL 4.3K 1% 1/8W

(AD-20 BOARD,BKH-2150/CARD RACK)

Ref.No. or Q'ty	Part No.	Description
R35,46,47,93,130,132	1-214-574-00	RES,METAL 5.1K 1% 1/8W
R96,178	1-214-575-00	RES,METAL 5.6K 1% 1/8W
R121	1-214-576-00	RES,METAL 6.2K 1% 1/8W
R75,92	1-214-578-00	RES,METAL 7.5K 1% 1/8W
R12,60,61,138	1-214-579-00	RES,METAL 8.2K 1% 1/8W
R4,9,31,33,55,56,57,65, 83,102,103,122,134,141, 143,145,174,201,209, 210,211,221	1-214-581-00	RES,METAL 10K 1% 1/8W
R63,211,212	1-214-583-00	RES,METAL 12K 1% 1/8W
R80	1-214-584-00	RES,METAL 13K 1% 1/8W
R78,100	1-214-585-00	RES,METAL 15K 1% 1/8W
R76	1-214-587-00	RES,METAL 18K 1% 1/8W
R23,26,27,28,79,216	1-214-588-00	RES,METAL 20K 1% 1/8W
R3,120,146,205,206	1-214-589-00	RES,METAL 22K 1% 1/8W
R53,54,62,74,133	1-214-590-00	RES,METAL 24K 1% 1/8W
R144	1-214-592-00	RES,METAL 30K 1% 1/8W
R32,64,66,104,108,119, 139,172	1-214-593-00	RES,METAL 33K 1% 1/8W
R222	1-215-440-00	RES,METAL 6.2K 1% 1/6W
R223	1-215-444-00	RES,METAL 9.1K 1% 1/6W
R107	1-215-453-00	RES,METAL 22K 1% 1/6W
R17,18	1-215-471-00	RES,METAL 120K 1% 1/6W
R112	1-215-472-00	RES,METAL 130K 1% 1/6W
R20	1-215-473-00	RES,METAL 150K 1% 1/6W
R24	1-215-476-00	RES,METAL 200K 1% 1/6W
R22	1-215-477-00	RES,METAL 220K 1% 1/6W
R19	1-215-479-00	RES,METAL 270K 1% 1/6W
R58	1-215-820-11	RES,METAL 39K 1% 1/8W
R177	1-215-822-11	RES,METAL 47K 1% 1/8W

(AD-20 BOARD,BKH-2150/CARD RACK)

Ref.No. or Q'ty	Part No.	Description
R98,148	1-215-823-11	RES,METAL 51K 1% 1/8W
R15	1-215-826-11	RES,METAL 68K 1% 1/8W
R30,114	1-215-827-11	RES,METAL 75K 1% 1/8W
R2,14,21,51,52,99,101, 105,106,109,111,136, 202,203,214,219	1-215-830-11	RES,METAL 100K 1% 1/8W
RV10	1-228-452-00	RES,VAR,CERMET 50
RV11	1-228-453-00	RES,VAR,CERMET 100
RV13	1-228-454-00	RES,VAR,CERMET 200
RV12	1-228-456-00	RES,VAR,CERMET 1K
RV2	1-228-457-00	RES,VAR,CERMET 2K
RV15	1-228-458-00	RES,VAR,CERMET 5K
RV8,16	1-228-459-00	RES,VAR,CERMET 10K
RV4,5,6	1-228-460-00	RES,VAR,CERMET 20K
RV9	1-228-473-00	RES,VAR,CERMET 5K
RV1	1-230-740-21	RES,VAR,CARBON 5K
RB2,3	1-231-449-00	RES,BLOCK 620x8
RB1	1-231-450-00	RES,BLOCK 3.3Kx8
RB5	1-231-504-00	RES,BLOCK 620x4
RB4	1-231-533-00	RES,BLOCK 10Kx4
LPF1	1-231-621-00	FILTER,LOW-PASS
L1,2	1-408-409-00	INDUCTOR,MICRO 10 5%
BPF1	1-409-402-11	COIL,VAR 19.3
LV2,3	1-410-290-11	COIL,VAR 10
LV1	1-410-291-11	COIL,VAR 1.2
DL3	1-415-173-00	DELAY LINE,50nsx10
L1	1-415-431-11	DELAY LINE,50ns
DL2	1-415-434-11	DELAY LINE,10nsx5
L4,5,6,7	1-421-329-00	COIL,CHOKE
L3	1-446-330-00	TRANSFORMER,PULSE
VCO1	1-464-514-11	VCO 14.33MHz
S4	1-552-509-00	SWITCH,DIP,1-CKT
S2	1-553-441-00	SWITCH,TOGGLE
S3	1-553-564-00	SWITCH,ROTARY
S1	1-570-279-11	SWITCH,DIP,2-CKT
R179,180	1-806-886-11	THERMISTOR,POSITIVE 33
1pc	2-282-313-00	KONB,CONTROL

(AD-20 BOARD,BKH-2150/CARD RACK)

Ref.No. or Q'ty	Part No.	Description
1pc	() 2-375-787-01	LABEL (AD-20),PC BOARD
TP1,2,3,4,5,6,7,8,9,10, 11,12,13,14,15,16,17, 18,19,20,22,23,24,25, 26,27,28,29,30,31,32, 33,34,35,36,37	() 3-673-772-41	TERMINAL,TP
1pc	() 3-673-865-00	LEVER
1pc	() 3-673-867-01	PLATE,INDICATION,PC BOARD
TPE1,2,3,4,5	() 3-685-366-11	TERMINAL,TP
1pc	7-621-737-08	SET SCREW,2.6x3,FLAT POINT
4pcs	7-621-981-15	SCREW,PSW 2.6x6
2pcs	7-626-317-21	PIN,SPRING 2.5x8
D1,2,9,18	8-719-000-12	DIODE MC931
D12,13,14,15	8-719-101-97	DIODE 1SS97-1
D17	8-719-102-52	DIODE 1SZ52
D4	8-719-812-41	LED,TLR124,RED
D5	8-719-812-43	LED,TLG124A,GREEN
D3,6,7,8,11,16	8-719-901-33	DIODE 1SS133
D10	8-719-920-22	DIODE 1SV134
Q5,7,11,12	8-729-115-30	TRANSISTOR 2SK105A-30
Q1,9,18,19	8-729-117-54	TRANSISTOR 2SA1175
Q2,3,4,17	8-729-190-12	TRANSISTOR 2SC2901
Q20	8-729-672-43	TRANSISTOR 2SC2724
Q8,10,13,15	8-729-900-61	TRANSISTOR DTA114ES
Q6,16	8-729-900-80	TRANSISTOR DTC114ES
IC89	8-741-134-10	IC BX1341

Ref.No. or Q'ty	Part No.	Description
(AD-20 BOARD,BKH-2150/CARD RACK)		
IC3A,3E,5N,58,71	8-743-810-00	IC BX381
IC5K	8-752-015-81	CX20158
IC2VW	8-752-022-02	IC CX20220-1DOT
IC1L,3MN	8-752-306-50	IC CX23065
IC2F,2L,2MN,3JK,3LM,4B, 4K 4M,4V	8-759-000-01	IC MC74HC4538N
IC1JK,1LM,2LM,4S.4W,4X, 5D,5U,6U	8-759-001-01	IC MC74HC00N
IC1X,2X,3X	8-759-301-01	IC HD10101
IC3T	8-759-301-02	IC HD10102
IC2H	8-759-016-48	IC MC1648P
IC59	8-759-100-54	IC UPA54H
IC60	8-759-100-64	IC UPA64H
IC2P	8-759-103-19	IC UPC319C
IC3P,6N	8-759-103-93	IC UPC393C
IC3V	8-759-135-80	IC UPC358C
IC2JK,4U	8-759-202-22	IC TC74HC74P
IC4J,5X	8-759-202-33	IC TC74HC240P
IC4C,5S	8-759-202-74	IC TC74HC04P
IC5V,6M,6T,6W	8-759-202-86	IC TC74HC123P
IC4L	8-759-202-93	IC TC74HC153P
IC2BL,4EL,4FU	8-759-204-94	IC TC74HC00F
IC1DL	8-759-204-95	IC TC74HC02F
IC1CU	8-759-204-98	IC TC74HC08F
IC2CU,4RU,5RL	8-759-204-99	IC TC74HC10F

Ref.No. or Q'ty	Part No.	Description
(AD-20 BOARD,BKH-2150/CARD RACK)		
IC1BL,1BU,1DU,2BU,2DU, 3B,4DU,4FL,4RL,5RU	8-759-205-06	IC TC74HC74F
IC5PU	8-759-205-08	IC TC74HC86F
IC2CL,2DL,3C,3D,4DL	8-759-205-16	IC TC74HC161F
IC1CL	8-759-205-18	IC TC74HC175F
IC6V	8-759-700-81	IC NJM555D
IC5EF	8-759-900-08	IC SN74LS08N
IC5H	8-759-900-10	IC SN74LS10N
IC5T	8-759-900-33	IC SN74LS33N
IC6D	8-759-900-74	IC SN74LS74AN
IC6EF	8-759-901-23	IC SN74LS123N
IC6H	8-759-901-64	IC SN74LS164N
IC6P,6R,6X	8-759-902-21	IC SN74LS221N
IC6S	8-759-902-66	IC SN74LS266N
IC6J	8-759-906-86	IC AM686HC
IC1E,4T	8-759-918-40	IC CX20194
IC5W	8-759-918-41	IC CX20195
IC1HJ,6A	8-759-990-82	IC TL082CP
IC1N	8-759-990-84	IC TL084CN

Ref.No. or Q'ty	Part No.	Description
MY-21 BOARD (BKH-2150/CARD RACK)		
1pc	() A-6259-277-A	COMPLETE PCB,MY-21
(This assembly includes the following parts.)		
1pc	() X-3673-641-0	PLATE ASSY,SHIELD
C2,4	1-123-307-00	CAP,ELECT 100 20% 10V
C1,3	1-131-449-11	CAP,TANT 3.3 20% 16V
C5,6,7,8,9,10,11,12,13, 14,15,16,17,18,19,20, 21,22,23,24,25,26,27, 28,29,30,31,32,33,34, 35,36,37,38,39,40,41, 42,43,44,45,46,47,48, 49,50,51,52,53,54,55, 56,57,58,59,60,61,62, 63,64	1-161-894-00	CAP,CERAMIC 0.1 +80/-20% 50V
R13	1-214-545-00	RES,METAL 330 1% 1/8W
R18	1-214-546-00	RES,METAL 360 1% 1/8W
R1,2	1-214-552-00	RES,METAL 620 1% 1/8W
R3,4,5,6,7,8,9,10,12,14, 15,16,17,19,20,21,22, 23,24,25,26	1-214-581-00	RES,METAL 10K 1% 1/8W
RB10,11	1-231-410-00	RES,BLOCK 10Kx8
RB9	1-231-449-00	RES,BLOCK 620x8
CR1,2,3,4,5	1-231-455-00	CR PACK
CR6	1-231-456-00	CR PACK
RB4,5,6,7	1-231-504-00	RES,BLOCK 620x4
RB1,2,3,8	1-231-533-00	RES,BLOCK 10Kx4
DL1	1-415-433-11	DELAY LINE,30ns
L1,2	1-421-329-00	COIL,CHOKE
S3,4	1-552-509-00	SWITCH,DIP,1-CKT
S2	1-553-441-00	SWITCH,TOGGLE
S1	1-553-441-21	SWITCH,TOGGLE
1pc	() 2-375-784-01	LABEL (MY-21),PC BOARD
TP1,2,3,4,5,6,7	() 3-673-772-41	TERMINAL,TP

Ref.No. or Q'ty	Part No.	Description
(MY-21 BOARD,BKH-2150/CARD RACK)		
1pc	() 3-673-865-00	LEVER
1pc	() 3-673-867-00	PLATE,INDICATION,PC BOARD
TPE1,2,3,4,5,6	() 3-685-366-11	TERMINAL,TP
4pcs	7-621-981-15	SCREW,PSW 2.6x6
2pcs	7-626-317-21	PIN,SPRING 2.5x8
D1	8-719-812-41	LED,TLR124,RED
IC19,20	8-741-128-90	IC BX1289
IC3K,3L	8-759-001-01	IC MC74HC00N
IC3S	8-759-001-42	IC MC74HC174N
IC1D	8-759-001-90	IC MC74F74N
IC3P,5B,5L	8-759-202-14	IC TC74HC08P
IC3M	8-759-202-16	IC TC74HC11P
IC4M	8-759-202-19	IC TC74HC21P
IC3R,4L	8-759-202-21	IC TC74HC32P
IC1T,2J,3N,4N,5A	8-759-202-22	IC TC74HC74P
IC1E,1F,4P,5M	8-759-202-24	IC TC74HC86P
IC5N,5P	8-759-203-11	IC TC74HC240P
IC1J,1U,2H,2U,3D,3E,3F, 4D,4G,4H,5E,5F,21,22	8-759-203-51	IC TC74HCT574P
IC2,4,6,8,10,12,14,16, 18	8-759-205-46	IC TMM2015AP-90
IC1V,2V,3V	8-759-300-25	IC HD10125
IC4S	8-759-300-67	IC HM6168HP-45
IC4V,5V,6V	8-759-301-24	IC HD10124

Ref.No. or Q'ty	Part No.	Description
(MY-21 BOARD,BKH-2150/CARD RACK)		
IC4R	8-759-900-00	IC SN74LS00N
IC5C	8-759-900-20	IC SN74LS20N
IC5R,5S	8-759-902-40	IC SN74LS240N
IC4J,5G	8-759-906-76	IC 74F283PC
IC5H,5J	8-759-909-47	IC SN74ALS574N
IC1,3,5,7,9,11,13,15,17	8-759-910-01	IC CX23024
IC1GH	8-759-918-31	IC CX23082
IC3J	8-759-918-32	IC CX20219
IC2G,3G,4E,4F,5D	8-759-918-33	IC CX20160
IC1B,1C,2B,2C	8-759-918-34	IC CX20161
IC3T	8-759-918-36	IC CX20163
IC5T	8-759-918-37	IC CX20164
IC3B,3C	8-759-918-38	IC CX20165
IC2F,2D,4B,4C,4K,5K	8-759-918-39	IC CX20167
IC3H	8-759-918-40	IC CX20194

Ref.No. or Q'ty	Part No.	Description
SG-10 BOARD (BKH-2150/CARD RACK)		
1pc	() A-6259-276-A	COMPLETE PCB,SG-10
(This assembly includes the following parts.)		
1pc	() X-3673-641-0	PLATE ASSY,SHIELD
C52,137,143	1-107-074-00	CAP,MICA 36PF 5% 50V
C53,102	1-107-158-00	CAP,MICA 30PF 5% 500V
C46	1-107-159-00	CAP,MICA 33PF 5% 500V
C44	1-107-202-00	CAP,MICA 10PF 5% 500V
C149	1-107-210-00	CAP,MICA 22PF 5% 500V
C145	1-109-527-00	CAP,MICA 47PF 5% 100V
C68	1-109-532-00	CAP,MICA 75PF 5% 100V
C112	1-109-535-00	CAP,MICA 100PF 5% 100V
C74	1-109-537-00	CAP,MICA 120PF 5% 100V
C135	1-109-539-00	CAP,MICA 150PF 5% 100V
C16,26,105,110,301,302	1-109-541-00	CAP,MICA 200PF 5% 100V
C108	1-109-542-00	CAP,MICA 220PF 5% 100V
C70	1-109-547-00	CAP,MICA 330PF 5% 100V
C62	1-109-548-00	CAP,MICA 360PF 5% 100V
C114	1-109-549-00	CAP,MICA 390PF 5% 100V
C3	1-109-558-00	CAP,MICA 750PF 5% 100V
C31,32,133,177	1-123-321-00	CAP,ELECT 220 20% 16V
C403,405	1-124-234-00	CAP,ELECT 22 20% 16V
C401	1-124-241-41	CAP,ELECT 22 20% 25V
C7,58,107,153,156,183	1-130-471-00	CAP,MYLAR 0.001 5% 50V
C148	1-130-475-00	CAP,MYLAR 0.0022 5% 50V
C76,118,119,120,121,122, 123,124,125,162,163, 164,165,166,167,168, 169	1-130-479-00	CAP,MYLAR 0.0047 5% 50V
C1,92	1-130-481-00	CAP,MYLAR 0.0068 5% 50V
C27,94	1-130-483-00	CAP,MYLAR 0.01 5% 50V

(SG-10 BOARD,BKH-2150/CARD RACK)

Ref.No. or Q'ty	Part No.	Description
C17	1-130-485-00	CAP,MYLAR 0.015 5% 50V
C42,73	1-130-487-00	CAP,MYLAR 0.022 5% 50V
C49,50	1-131-349-00	CAP,TANT 2.2 10% 35V
C9,19,20,43,71,85,109, 147,179	1-131-353-00	CAP,TANT 10 10% 35V
C81,88	1-131-373-00	CAP,TANT 22 10% 16V
C2,5,11,13,37,59,61,64, 67,75,91,95,97,99,113, 136,139,142,173,174, 175,304	1-131-449-11	CAP,TANT 3.3 20% 16V
C4,6,8,10,12,14,15,18, 21,22,23,24,25,28,29, 30,33,34,35,36,38,39, 40,41,45,47,48,51,54, 55,56,57,60,63,65,66, 69,72,77,78,79,80,82, 83,84,86,87,89,90,93, 96,98,100,101,103,104, 106,111,115,116,117, 126,127,128,129,130, 131,132,134,138,140, 141,144,146,150,151, 152,154,155,157,158, 159,160,161,170,171, 172,176,178,180,181, 182,303,305,402,404, 406,407,408,409,410, 411,412	1-161-894-00	CAP,CERAMIC 0.1 +80/-20% 50V
R17	1-214-517-00	RES,METAL 22 1% 1/8W
R117	1-214-526-00	RES,METAL 51 1% 1/8W
R76,88,120	1-214-530-00	RES,METAL 75 1% 1/8W
R213,218	1-214-537-00	RES,METAL 150 1% 1/8W
R78,90,91	1-214-540-00	RES,METAL 200 1% 1/8W
R14,83,84	1-214-544-00	RES,METAL 300 1% 1/8W
R100,101	1-214-545-00	RES,METAL 330 1% 1/8W
R50,58	1-214-546-00	RES,METAL 360 1% 1/8W
R44	1-214-550-00	RES,METAL 510 1% 1/8W
R16	1-214-553-00	RES,METAL 680 1% 1/8W

(SG-10 BOARD,BKH-2150/CARD RACK)

Ref.No. or Q'ty	Part No.	Description
R7,15,18,20,24,70,85,93, 214,219,303	1-214-557-00	RES,METAL 1K 1% 1/8W
R92	1-214-561-00	RES,METAL 1.5K 1% 1/8W
R8	1-214-562-00	RES,METAL 1.6K 1% 1/8W
R86	1-214-563-00	RES,METAL 1.8K 1% 1/8W
R39,74	1-214-564-00	RES,METAL 2K 1% 1/8W
R19	1-214-565-00	RES,METAL 2.2K 1% 1/8W
R63,104	1-214-567-00	RES,METAL 2.7K 1% 1/8W
R75,105	1-214-568-00	RES,METAL 3K 1% 1/8W
R13,46,87	1-214-569-00	RES,METAL 3.3K 1% 1/8W
R23,69,110,210	1-214-571-00	RES,METAL 3.9K 1% 1/8W
R89,211,217	1-214-573-00	RES,METAL 4.7K 1% 1/8W
R3,98,124,201	1-214-574-00	RES,METAL 5.1K 1% 1/8W
R6,43	1-214-575-00	RES,METAL 5.6K 1% 1/8W
R81	1-214-577-00	RES,METAL 6.8K 1% 1/8W
R34,103	1-214-578-00	RES,METAL 7.5K 1% 1/8W
R27,62,125	1-214-579-00	RES,METAL 8.2K 1% 1/8W
R4,5,9,10,11,21,22,25, 26,52,53,54,55,56,57, 60,64,65,79,96,97,99, 107,108,111,112,113, 114,118,119,121,122, 123,202,203,204,205, 206,215,216,304	1-214-581-00	RES,METAL 10K 1% 1/8W
R40,301	1-214-583-00	RES,METAL 12K 1% 1/8W
R28,33,36,38,41,94	1-214-585-00	RES,METAL 15K 1% 1/8W
R102	1-214-586-00	RES,METAL 16K 1% 1/8W
R45,73,82,302	1-214-588-00	RES,METAL 20K 1% 1/8W
R61	1-214-589-00	RES,METAL 22K 1% 1/8W
R72,95	1-214-590-00	RES,METAL 24K 1% 1/8W

(SG-10 BOARD,BKH-2150/CARD RACK)

Ref.No. or Q'ty	Part No.	Description
R47,48,51,115,116	1-214-592-00	RES,METAL 30K 1% 1/8W
R1,212	1-214-593-00	RES,METAL 33K 1% 1/8W
R37	1-215-408-00	RES,METAL 300 1% 1/6W
R49	1-215-459-00	RES,METAL 39K 1% 1/6W
R67	1-215-471-00	RES,METAL 120K 1% 1/6W
R12,71	1-215-477-00	RES,METAL 220K 1% 1/6W
R80	1-215-493-00	RES,METAL 1M 1% 1/6W
R109	1-215-820-11	RES,METAL 39K 1% 1/8W
R77	1-215-822-11	RES,METAL 47K 1% 1/8W
R59,305	1-215-823-11	RES,METAL 51K 1% 1/8W
R32	1-215-829-11	RES,METAL 91K 1% 1/8W
R2,30,31,35,42,66,68, 106,198,199	1-215-830-11	RES,METAL 100K 1% 1/8W
RV9,15	1-228-457-00	RES,VAR,CERMET 2K
RV7,11,12,13	1-228-458-00	RES,VAR,CERMET 5K
RV6,10	1-228-459-00	RES,VAR,CERMET 10K
RV1,8	1-228-460-00	RES,VAR,CERMET 20K
RV14	1-228-462-00	RES,VAR,CERMET 100K
RV2,3,4,5	1-230-740-21	RES,VAR,CARBON 5K
RB2	1-231-504-00	RES,BLOCK 620x4
RB1,3	1-231-533-00	RES,BLOCK 10Kx4
BPF1	1-235-564-11	FILTER,BANDPASS
L3	1-408-429-00	INDUCTOR,MICRO 470
LV1	1-410-290-11	INDUCTOR,VAR,10
DL3	1-415-121-00	DELAY LINE,10nsx10
DL1	1-415-430-11	DELAY LINE,30ns
DL2	1-415-431-11	DELAY LINE,50ns
L1,2,4,5	1-421-329-00	COIL,CHOKE
VCO1,2	1-527-478-00	VCO,CRYSTAL 14.31818MHz
S1,6	1-552-509-00	SWITCH,DIP,1-CKT
S5	1-553-441-00	SWITCH,TOGGLE
S3,4	1-570-276-11	SWITCH,DIP,6-CKT
S2	1-570-280-11	SWITCH,DIP,3-CKT
4pcs	2-282-313-00	KNOB,CONTROL
TP1,2,3,4,5,6,7,8,9,10, 11,12,13,14,15 ()	3-673-772-41	TERMINAL,TP

(SG-10 BOARD,BKH-2150/CARD RACK)

Ref.No. or Q'ty	Part No.	Description
1pc ()	2-375-785-01	LABEL (SG-10),PC BOARD
1pc ()	3-673-865-00	LEVER
1pc ()	3-673-867-00	PLATE,INDICATION,PC BOARD
TPE1,2,3,4 ()	3-685-366-11	TERMINAL,TP
4pcs	7-621-737-08	SET SCREW,2.6x3,FLAT POINT
4pcs	7-621-981-15	SCREW,PSW 2.6x6
2pcs	7-626-317-21	PIN,SPRING 2.5x8
D4	8-719-168-07	DIODE,RD6.8E-B
D7	8-719-812-41	LED,TLR124,RED
D5	8-719-812-43	LED,TLG124A GREEN
D102	8-719-102-52	DIODE,1SZ52
D1,2,3,6,101	8-719-901-33	DIODE 1SS133
Q101	8-729-105-72	TRANSISTOR 2SK523-L1
Q7	8-729-105-73	TRANSISTOR 2SK523-L2
Q103	8-729-117-54	TRANSISTOR 2SA1175
Q1,2,4,6	8-729-190-12	TRANSISTOR 2SC2901
Q8,102	8-729-672-43	TRANSISTOR 2SC2724
Q5	8-729-699-51	TRANSISTOR 2SA995
Q3,201	8-729-900-65	TRANSISTOR DTA144ES
IC6,14	8-743-810-00	IC BX381
IC3	8-757-930-11	IC CX7930A
IC3U	8-759-001-07	IC MC74HC10N
IC1D,1E	8-759-001-38	IC MC74HC163N
IC2Q	8-759-001-39	IC MC74HC164N
IC15	8-759-103-93	IC UPC393C
IC1A	8-759-135-80	IC UPC358C
IC4P,4R,5P,5R	8-759-140-51	IC UPD4051BC
IC2R,2U,5T	8-759-202-11	IC TC74HC00P
IC2V	8-759-202-14	IC TC74HC08P
IC3T,4S	8-759-202-74	IC TC74HC04P
IC1F	8-759-203-18	IC TC74HC253P
IC5S	8-759-203-24	IC TC74HC283P
IC4U	8-759-301-24	IC HD10124
IC2A,2M,3B,4L,5D	8-759-900-00	IC SN74LS00N

Ref.No. or Q'ty	Part No.	Description
(SG-10 BOARD,BKH-2150/CARD RACK)		
IC3M	8-759-900-04	IC SN74LS04N
IC4N	8-759-900-08	IC SN74LS08N
IC2N,22	8-759-900-10	IC SN74LS10N
IC5B	8-759-900-20	IC SN74LS20N
IC5L	8-759-900-59	IC HI1-0201-5
IC2B,3A,3N,4B,20,21	8-759-900-74	IC SN74LS74AN
IC4A	8-759-900-86	IC SN74LS86N
IC1C,2F,2J	8-759-901-23	IC SN74LS123N
IC1K,2T	8-759-901-53	IC SN74LS153N
IC5C	8-759-901-61	IC SN74LS161AN
IC1J	8-759-901-63	IC SN74LS163AN
IC2S	8-759-901-75	IC SN74LS175N
IC2E,2P,3C,3E,3P,4M, 5A,5G	8-759-902-21	IC SN74LS221N
IC1H	8-759-904-18	IC SN74LS00AN
IC5E	8-759-906-66	IC 74F86PC
IC2	8-759-908-39	IC CX7998
IC4C,5H,5	8-759-918-23	IC NE527N
IC4	8-759-918-30	IC TL592P
IC16	8-759-918-35	IC CX20162
IC8	8-759-930-80	IC CA3080E
IC1,7,9,10,11,12,13	8-759-990-82	IC TL082CP

Ref.No. or Q'ty	Part No.	Description
PR-64 BOARD (BKH-2150/CARD RACK)		
1pc	() A-6257-142-A	COMPLETE PCB,PR-64
(This assembly includes the following parts.)		
1pc	() X-3673-641-0	PLATE ASSY,SHIELD
C41	1-107-204-00	CAP,MICA 12PF 5% 500V
C205	1-107-209-00	CAP,MICA 20PF 5% 500V
C206	1-107-210-00	CAP,MICA 22PF 5% 500V
C201	1-109-531-00	CAP,MICA 68PF 5% 100V
C3,7	1-109-534-00	CAP,MICA 91PF 5% 100V
C16	1-109-545-00	CAP,MICA 270PF 5% 100V
C26	1-109-549-00	CAP,MICA 390PF 5% 100V
C17,30,35	1-109-554-00	CAP,MICA 510PF 5% 100V
C9,10,39	1-123-357-00	CAP,ELECT 22 20% 35V
C48,49,50,51,52,53	1-123-343-00	CAP,ELECT 33 20% 35V
C43,44,45,46	1-123-359-00	CAP,ELECT 47 20% 35V
C15,38	1-123-380-00	CAP,ELECT 1 20% 50V
C14	1-130-471-00	CAP,MYLAR 0.001 5% 50V
C31	1-130-483-00	CAP,MYLAR 0.01 5% 50V
C36	1-130-489-00	CAP,MYLAR 0.033 5% 50V
C1,2,5,6,11,12,18,19,20, 21,24,25,27,29,32,34, 37	1-131-352-00	CAP,TANT 6.8 10% 35V
C40	1-131-358-00	CAP,TANT 6.8 10% 25V
C4	1-131-373-00	CAP,TANT 22 10% 16V
C13,22,23,28,33,47,121, 122	1-161-055-00	CAP,CERAMIC 0.022 10% 50V
C202,203	1-161-888-00	CAP,CERAMIC 0.01 +80/-20% 50V
C47,83	1-215-373-31	RES,METAL 10 1% 1/6W
R10	1-215-381-31	RES,METAL 22 1% 1/6W
R19,53,55,57,66,93	1-215-389-00	RES,METAL 47 1% 1/6W

Ref.No. or Q'ty	Part No.	Description
(PR-64 BOARD,BKH-2150/CARD RACK)		
R29,30,31,207,208	1-215-390-31	RES,METAL 51 1% 1/6W
R14,25,52,59,98,107	1-215-394-00	RES,METAL 75 1% 1/6W
R4,6,8	1-215-396-00	RES,METAL 91 1% 1/6W
R34,102	1-215-397-00	RES,METAL 100 1% 1/6W
R16	1-215-399-00	RES,METAL 120 1% 1/6W
R60,99,101,209,210,304	1-215-401-11	RES,METAL 150 1% 1/6W
R13,18,40	1-215-404-00	RES,METAL 200 1% 1/6W
R104	1-215-405-00	RES,METAL 220 1% 1/6W
R3,5,58,89,108,203,204	1-215-407-00	RES,METAL 270 1% 1/6W
R9,11,20,21	1-215-408-00	RES,METAL 300 1% 1/6W
R17,22,23,32,33	1-215-410-00	RES,METAL 360 1% 1/6W
R70	1-215-412-00	RES,METAL 430 1% 1/6W
R63,65,122	1-215-415-00	RES,METAL 560 1% 1/6W
R96,97,211	1-215-416-00	RES,METAL 620 1% 1/6W
R7	1-215-417-00	RES,METAL 680 1% 1/6W
R38,68	1-215-418-00	RES,METAL 750 1% 1/6W
R61	1-215-419-00	RES,METAL 820 1% 1/6W
R28,37,44,69,72,205,206	1-215-421-00	RES,METAL 1K 1% 1/6W
R36	1-215-422-00	RES,METAL 1.1K 1% 1/6W
R24,54,56	1-215-423-00	RES,METAL 1.2K 1% 1/6W
R12,85	1-215-425-00	RES,METAL 1.5K 1% 1/6W
R92	1-215-426-00	RES,METAL 1.6K 1% 1/6W
R2	1-215-427-00	RES,METAL 1.8K 1% 1/6W

Ref.No. or Q'ty	Part No.	Description
(PR-64 BOARD,BKH-2150/CARD RACK)		
R1	1-215-429-00	RES,METAL 2.2K 1% 1/6W
R49	1-215-431-00	RES,METAL 2.7K 1% 1/6W
R15,41,71	1-215-433-00	RES,METAL 3.3K 1% 1/6W
R62,64,75	1-215-436-00	RES,METAL 4.3K 1% 1/6W
R26,48,50,51,74,82,103	1-215-437-00	RES,METAL 4.7K 1% 1/6W
R123	1-215-438-00	RES,METAL 5.1K 1% 1/6W
R67	1-215-440-00	RES,METAL 6.2K 1% 1/6W
R94	1-215-443-00	RES,METAL 8.2K 1% 1/6W
R35	1-215-444-00	RES,METAL 9.1K 1% 1/6W
R79,81,88,90,130,301	1-215-445-00	RES,METAL 10K 1% 1/6W
R45	1-215-447-00	RES,METAL 12K 1% 1/6W
R91,106	1-215-449-00	RES,METAL 15K 1% 1/6W
R86,87	1-215-452-00	RES,METAL 20K 1% 1/6W
R78	1-215-454-00	RES,METAL 24K 1% 1/6W
R43	1-215-462-00	RES,METAL 51K 1% 1/6W
R42,73,105	1-215-468-00	RES,METAL 91K 1% 1/6W
R76,77,84	1-215-476-00	RES,METAL 200K 1% 1/6W
R80	1-215-486-00	RES,METAL 510K 1% 1/6W
R46	1-215-493-00	RES,METAL 1M 1% 1/6W
RV6	1-224-936-00	RES,VAR,METAL 500
RV11,12	1-224-939-00	RES,VAR,METAL 5K
RV8	1-224-940-00	RES,VAR,METAL 10K
RV5,7,9,13	1-224-941-00	RES,VAR,METAL 20K
RV10	1-224-978-00	RES,VAR,METAL 50
RV4	1-228-288-00	RES,VAR,METAL 100
RV1,2,3	1-230-740-21	RES,VAR,CARBON 5K
RB4	1-231-449-00	RES,BLOCK 620x8
RB5,7,8,9	1-231-455-00	CR PACK

(PR-64 BOARD,BKH-2150/CARD RACK)

Ref.No. or Q'ty		Part No.	Description
RB1		1-231-513-00	RES,BLOCK 1.5K x4
CP1		1-235-102-00	CR PACK
FL3		1-235-150-00	FILTER,LOW-PASS
FL1		1-235-151-00	FILTER,BANDPASS
FL2		1-235-152-00	FILTER,BANDPASS
FL5		1-235-153-00	FILTER,LOW-PASS
FL4		1-235-154-00	FILTER,LOW-PASS
L1		1-408-425-00	INDUCTOR,MICRO 220 5%
DL1		1-415-189-00	DELAY LINE 140ns
L2,3,4,5		1-421-329-00	COIL,CHOKE
FB1,2,3,4,5,6,7,8,10,11, 12,13		1-535-178-00	FERRITE BEAD
S3		1-552-509-00	SWITCH,DIP,1-CKT
S2		1-553-441-00	SWITCH,TOGGLE
S1		1-570-280-11	SWITCH,DIP,3-CKT
3pcs		2-282-313-00	KNOB,CONTROL
1pc	()	2-375-786-01	LABEL (PR-64),PC BOARD
2pcs	()	3-645-566-00	BAND,BINDING
TP1,2,3,4,5,7,8,9,10,11, 12,13,14,15,16,17	()	3-673-772-41	TERMINAL,TP
1pc	()	3-673-865-00	LEVER
1pc	()	3-673-867-00	PLATE,INDICATION,PC BOARD
TPE1,2,3,4	()	3-685-366-11	TERMINAL,TP
3pcs		7-621-737-08	SET SCREW,2.6x3,FLAT POINT
4pcs		7-621-981-15	SCREW,PSW 2.6x6
2pcs		7-626-317-21	PIN,SPRING 2.5x8
D1		8-719-151-07	DIODE RD5.1E-B
D5		8-719-175-07	DIODE RD7.5E
D4		8-719-815-55	DIODE 1S1555
D3		8-719-815-87	DIODE 1S1587
Q13,16		8-729-112-06	TRANSISTOR 2SA1206-K
Q3,4,10,15		8-729-117-54	TRANSISTOR 2SA1175
Q2,11,12		8-729-190-12	TRANSISTOR 2SC2901
Q8,9		8-729-606-34	TRANSISTOR 2SC2603-G
Q5		8-729-658-32	TRANSISTOR 2SC1583
Q6,7,14		8-729-672-43	TRANSISTOR 2SC2724
Q1		8-729-699-51	TRANSISTOR 2SA995
IC12		8-749-936-51	IC BX365A
IC3,4		8-749-936-61	IC BX366A
IC14		8-752-005-11	IC CX20051A
IC16,17		8-759-001-15	IC MC10115L
IC1,15		8-759-001-16	IC MC10116L
IC9		8-759-015-95	IC MC1595L
IC6		8-759-145-57	IC UPC4557C
IC7,8		8-759-902-21	IC SN74LS221N
IC5,10		8-759-906-07	IC TL607CP
IC2		8-759-931-02	IC CA3102E
IC18		8-759-990-82	IC TL082CP
IC11		8-759-990-84	IC TL084CN

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